TELEPHONY

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Measuring the Production Of Telephone Salesmen

By J. S. HANNA

OUTLINE OF PLAN for accurately measuring effects of skill and diligence, and rating in one composite figure the production for each salesman. Benefits to the company and to the employe

THE sales plan now generally in use throughout the telephone industry provides for a coverage of the various markets with a well-trained force on a scheduled interview basis. There is in addition, of course, the employe sales plan from which the sales force receives prospect slips, and the business office which supplies demand leads and disconnect requests.

This, in brief, constitutes the job of the salaried sales force as distinguished from other sales activities, particularly the non-user canvassing project which is ordinarily conducted on a commission basis.

The results for this group as a whole are easily and adequately measured. Supervisory reports issued on a monthly basis tell at a glance the progress made on market coverage, the sales and revenue gained for each type of project and the cost of carrying on each activity. From these reports the management can mould its sales policy, while the supervisor is enabled thereby to carry out his program in an intelligent manner.

Indeed, every aspect of the entire sales job is adequately measured with possibly the one exception of the individual performance of the salesman. Yet from the standpoint of maintaining uniform production such a measurement is of importance, not only to the supervisor but to the salesman as well. Even the management might find individual results data interesting from the standpoint of other service ratings, selection of supervisory material, etc.

However, it will be admitted as fundamental that in any undertaking it is desirable to measure the performance of those who participate. Particularly is this true of sales work where the success of the undertaking hinges largely on qualities of personality, coupled with an abundance of energy.

With accurate production data currently available on each salesman, the supervisor can readily determine:

(a) Whether the proper selection of employes has been made,

(b) Whether any employes are unadaptable to sales work,

(c) Which employes are in need of further training,

(d) Which employes merit commendation and advancement.

Frequently sales supervisors are asked to name their best salesman. Generally speaking, this is not hard to do; nor is it difficult to point out the worst. Reputations establish themselves in the course of time and subconsciously we begin to recognize Brown as our best salesman and Smith as the worst.

But what of those in the middle ground; can we place them in their proper rating order? And, did Brown actually lead the group in production this month, or did he let down to a point where his production was on a par with the third man in the group?

Without any method of measuring production of salesmen, the supervisor because of personality factors and occasional outstanding sales might rate his men in this order: *A, B, C, D, E, F* and *G*.

On the other hand, with a fairly accurate method of measurement he might find that A does not lead the group as he had always supposed, and that D—whom he had generally rated as average—heads the list with the rest of the group rating something in this order: *D, B, C, A, F, E* and *G*.

Such a discovery may direct attention to the need for further training where it was not felt to be necessary heretofore, or to the need for closer supervision where confidence was previously misplaced.

Then, too, there is unquestioned benefit to be derived if the salesmen are aware of the fact that their results are measured. A definite challenge is presented and the response can generally be counted on to increase the total production to a marked degree. Likewise, with inaccurate and unfair methods of rating removed, there will be noted an improvement in morale which, again, means more sales.

As to the proper method of measurement, many have been experimented with and discarded when their inadequacies and defects be-

came apparent. Were all salesmen engaged in contacting the same type of market, the problem would be comparatively simple.

But in the majority of exchanges we do not have these large groups of specialists, and economy demands that all salesmen handle contacts in every type of market to a greater or lesser degree, thus intensifying the problem of comparing the production of one with another.

It is for exchanges of this size, where specialization is striven for but not carried to the extreme—exchanges with a sales force of from five to ten or more—that the suggestions contained herein will prove most helpful.

It is doubtless apparent to all who have been supervising sales work for any length of time that it is worse than useless to attempt to measure the production of individual salesmen by comparisons of number of sales, number of interviews or total revenue from new business thus secured.

The number and variety of contacts made by one salesman will never be identical to those made by all others in the group. The sales and revenue possibilities for each, therefore, will be different—even though all might be possessed of equal sales ability.

The facility of making sales, therefore, apart from the ability and efficiency of the salesman, differs with respect to: First, the buying power of the market; and, second, the time required to complete an interview in each type of market. The first is evidenced by "average interviews per sale," and the second by "average interviews per man per day" taken from monthly or cumulative results reports.

As an example, at the Alpha exchange salesmen handling employe prospect slips averaged for the year one sale for every 2.8 interviews, while the salesmen on scheduled small business projects had to make 14.4 to complete one sale. The salesmen on scheduled large P. B. X. projects averaged 3.5 interviews per day, while the average for scheduled small business projects was 10.1.

Stated differently, the salesman on large P. B. X.'s completed a sale when the day was three-fourths over while the salesman on small business projects theoretically closed his day without a sale and had to make 4.3 interviews the following day before he, too, could be credited with a sale.

It is apparent, therefore, that any method of rating which does not take into account these inequalities of time and market productiveness over which the salesman has no control, would be manifestly unfair to him and would not give the supervisor the measurement of the man's ability and efficiency. This, of course, is the primary purpose of any rating plan.

The foregoing factors are basic, however, in their importance in establishing a proper unit of measurement, for it is from these that the average work volume involved in completing any type of sale is determined.

This is accomplished by reducing these factors to "average days per sale" by dividing the "average interviews per sale" by the "average interviews per day" for each type of sale, both scheduled and demand. The resulting factors, shown in Columns *H* and *I*, Fig. 1, indicate clearly the wide variation in work volume involved in making each type of sale.

While it is not essential to an accurate application of these measurement factors, it has been found desirable to set up corresponding weight points for crediting each salesman's record. This is accomplished by assigning to that factor representing the least work volume, a base of one and computing its ratio to each of the others.

By referring to columns *H* and *I* again, it will be noted that less time and effort (on the average and for this particular exchange) is required to make one sale on "demand interviews, small business projects" than on any other type of contact, and that 0.23 of one day is required to complete one sale in this market.

This, then, becomes the unit of measurement and is given a weight of one point. By dividing 0.23 into each of the other values shown, the relative weight point value can be established for each type of sale, as is shown in columns *J* and *K*, Fig. 1.

COMING CONVENTIONS

Minnesota Telephone Association, Hotel Lowry, St. Paul, January 29-31.

Nebraska Telephone Association, Hotel Lincoln, Lincoln, February 13 and 14.

Iowa Independent Telephone Association, Hotel Fort Des Moines, Des Moines, February 26 and 27.

Wisconsin State Telephone Association, Park Hotel, Madison, March 5, 6 and 7.

Texas Telephone Association, Dallas, March 25, 26 and 27.

Ohio Independent Telephone Association, Hotel Deshler-Wallick, Columbus, May 1 and 2.

In computing these factors, it should be kept in mind that their accuracy as a measuring device will be greater if the basic results data cover a long period of time and represent a more or less general participation of the whole group.

Not less than 12 months' cumulative results should be used in order that the full effects of seasonal variations will be reflected in the averages. It would also appear desirable to have measurement factors as near current as possible. Rather than use the one set of averages throughout an entire year, they should be revised each quarter by dropping the first quarter's results, adding in the last quarter's results and computing the current 12 months' averages.

This procedure will permit the use of a new set of measurement factors with a standard gradually trending upward each quarter if training and supervision have been effective. The work sheet shown in Fig. 1 has been found very convenient in working up these measurement factors and something of similar nature might be devised to accommodate a broader sales program where necessary.

Once this table of weight points has been set up, it is only necessary to tally each man's sales by classes of interview, multiply each total by its corresponding weight point factor and take the sum of these products.

It should be apparent, then, that this final composite figure represents for each salesman not only the number of sales made but proper credit for the type of market worked in—credit for at least the average number of interviews for each type of sale reported plus further credit reflecting the degree of his ability above or below average and the efficiency with which he prosecuted his day-to-day job.

Since this method of measuring production is based on the average performance of the group, and since its correlation throughout is mathematically accurate, it eliminates all complaints of inequality of opportunity and definitely establishes the fact that those salesmen who lead the group do so only because of the following reasons:

Either they have acquired and applied greater sales ability than average or they made it a point to secure a greater number of interviews than average, or both. Their position as sales leaders cannot be questioned.

A typical monthly report for a sales force of 10 men is shown in Fig. 2 on page 10. Columns headed "sales" indicate the actual number of sales

opposite each type of contact made by each man. These figures multiplied by the corresponding weight point factors shown in Fig. 1, columns *J* and *K*, give the weight point values shown in the column headed "Wt. Pts.," with the total of actual sales and weight points shown at the bottom.

In order that the results of all salesmen may be comparable it is necessary to adjust the total weight points for the actual number of days each salesman worked on the basis of the maximum days worked. This adjusted total, shown on the last line, is, of course, the rate of production for each and represents our final measurement figure.

Other helpful information can, of course, be derived from this data. For example, the "average weight points per day" will vary from month to month due to seasonal economic demands, although its trend over a long period of time should be upward if supervision and training work have been effective.

The figure, "average weight points per man" should indicate to the supervisor the need for closer observation of contacts and more frequent coaching in the case of those salesmen falling below this figure.

While salesmen may vary from month to month in the order of their rating, their weight points may be combined directly as each monthly report is issued and a cumulative report established. This will reflect the relative standing of each salesman over a long period of months. Such cumulative figures should stand unquestioned.

A very practical application of the method is found in stimulating and measuring the results of group competition. In the first place, where a sales force is divided into two opposing teams, a more even distribution of talent is possible. This is true because the actual production rating of each salesman is definitely established.

In the second place, the knowledge that work done is measured and not lucky breaks—which generally is the case when sales or revenue alone is the yardstick used—tends to create a much better feeling and keener interest.

Where all understand that it is possible for a team with more weight points to win, even though its total sales and revenues may be less than that of the losing team, there will be no lack of real enthusiasm.

If, after computing weight point factors based on averages of your exchange and applying these to the sales results of your men, it is found that Jones (whom you are convinced is the best salesman in the whole area) does not rate first, do not condemn the method too hastily.

It may merely indicate that even though Jones does possess the most knowledge of selling he did not make full use of his superior skill; or that Smith, by working harder and consistently making more interviews, actually produced more work units for the period than did Jones. It must be kept in mind that this method makes no attempt to measure skill or ability per se but only as skill or ability affect production.

As the purpose of the sales force is to make sales, and as sales can only result from a definite amount of work of a certain standard—then, certainly, the best salesman is he who can turn out the largest work volume in any given period. This measurement, therefore, takes into consideration the other contributing factors as well, such as efficiency, industry, stability, etc., any one of which might offset the superior sales technique of another member of the force.

The real benefits from your production measurements, of course, will come only when you take some form of action as a result thereof. Hav-

SALES RATING FACTORS

QUARTERLY WORK SHEET

EXCHANGE SALES FORCE

QUARTER ENDING Sept. YEAR 1934. EXCHANGE OR DISTRICT Alpha

SALES PROJECTS	CUMULATIVE RESULTS LAST FOUR QUARTERS				MEASUREMENT FACTORS FOR USE THIS QUARTER						
	TOTAL INTERVIEWS		TOTAL SALES		INTERVIEWS PER SALE		INT'VWS PER MAN DAY	DAYS PER SALE		WEIGHT POINTS	
	(A) SCHEDULED	(B) DEMAND	(C) SCHEDULED	(D) DEMAND	(E) SCHEDULED	(F) DEMAND	(G) SCHEDULED & DEMAND	(H) SCHEDULED	(I) DEMAND	(J) SCHEDULED	(K) DEMAND
LARGE P.B.X.	473	67	176	35	2.7	1.9	3.5	.77	.54	3.3	2.3
MEDIUM BUSINESS	815	163	111	72	7.3	2.2	5.4	1.35	.40	5.9	1.7
SMALL BUSINESS	2742	244	190	99	14.4	2.4	10.1	1.42	.23	6.2	1.0
OTHER SALES	1978	x x x	542	x x x	3.6	x x x	5.1	.44	x x x	1.9	x x x
EMP. PROSPECT	1411	x x x	506	x x x	2.8	x x x	5.5	.51	x x x	2.2	x x x
DISC. REQUEST	2051	x x x	489	x x x	4.6	x x x	6.4	.72	x x x	3.1	x x x

COLUMNS (A),(B),(C),(D),(G), FROM CUMULATIVE SALES RESULTS REPORTS, ONE YEARS RESULTS TO NEAREST QUARTER.

COLUMN (E) = (A)/(C) COLUMN (F) = (B)/(D) COLUMN (H) = (E)/(G) COLUMN (I) = (F)/(G) COLUMN (J) = (H)/(*) COLUMN (K) = (I)/(*)

(*) USE LOWEST FACTOR IN COL. (H) OR (I).

Fig. 1. A Work Sheet for Use in Computing Measurement Factors. The Weight Points Shown in Columns J and K Represent the Relative Amount of Work Done in Making the Various Types of Sales.

ing discovered that Jones is not producing in accordance with his capacity, the next step is to determine the cause.

Coaching observations in the field may reveal excessive time lost as a result of failure to route contacts most economically or a tendency to spend too much time in the office. Likewise, the salesman who consistently rates low or out of line with the average for the group, certainly shows a need for individual attention. To be of any value, therefore, measurement results must be used effectively.

Additional studies have been made, looking toward the possibility of combining with the salesman's weight-point rating a measurement of his revenue production. Several methods were considered but none appeared to be feasible, principally because of the fact that the average revenue per sale by classes of contact vary widely from month to month for the same individual.

This appears to be due to seasonal and other economic factors, rather than to any possible fluctuations in the salesman's ability. Such a plan, therefore, might result only in providing discouraging penalties for factors beyond the control of the salesman.

For measuring the salesman's ability to obtain all of the available revenue out of the market, it is believed more desirable to continue the present practice of a day-to-day review of contacts and frequent observations in the field by the supervisor.

For all practical purposes, however, the method outlined should prove thoroughly adequate. Its most attractive features lie in the fact that it does away with all guess methods of estimating sales production and hazy attempts to balance total interviews and sales of one salesman with those of another.

Because it compensates for the two variable factors of time and productivity of market for all salesmen, it measures accurately the effects of skill and diligence and reflects in one composite figure the rate of production for each salesman. Such a measurement should enable the supervisor to take quick corrective action where needed and to correctly recognize and commend results where merited.

SALESMEN'S PRODUCTION RECORD

EXCHANGE SALES FORCE

MONTH October YEAR 1934 EXCHANGE OR DISTRICT Alpha

TYPE OF SALE		SALESMEN																									
		Brown		Rogers		Sawyer		Walton		Smith		White		Stanley		Hilton		McCauley		Hill				TOTAL	
		SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.	SALES	WT. PTS.
PBX	SCHEDULED							8	26.4			3	9.9	1	3.3									12	39.6
	DEMAND							1	2.3															1	2.3
MEDIUM	SCHEDULED	6	35.4	7	41.3			4	23.6	1	5.9	2	11.8	2	11.8	1	5.9	1	5.9					24	141.6
	DEMAND	2	3.4	3	5.1																			5	8.5
SMALL	SCHEDULED	5	31.0	10	62.0	6	37.2	5	31.0			6	37.2	6	37.2	1	6.2							39	241.8
	DEMAND			1	1.0							3	3.0	1	1.0									5	5.0
OTHER		11	20.9	3	5.7	16	30.4	1	1.9	2	3.8	1	1.9	3	5.7	5	9.5	15	28.5					57	108.3
PROSPECT		9	19.8	2	4.4	12	26.4	1	2.2			5	11.0	1	2.2			11	24.2	1	2.2			42	92.4
DISC. REQUEST		12	37.2	3	9.3					12	37.2	1	3.1	3	9.3	14	43.4	2	6.2	12	37.2			59	182.9
TOTAL		45	147.7	29	128.8	34	94.0	20	87.4	15	46.9	21	77.9	17	70.5	21	65.0	29	64.8	13	39.4			244	822.4
DAYS WORKED		23	xxx	23	xxx	23	xxx	22	xxx	13	xxx	23	xxx	23	xxx	23	xxx	23	xxx	19	xxx		xxx	215	xxx
ADJUSTED TOTAL		xx	147.7	xx	128.8	xx	94.0	xx	91.3	xx	83.0	xx	77.9	xx	70.5	xx	65.0	xx	64.8	xx	47.6	xx		xx	870.6

GENERAL DATA		REMARKS
(a) TOTAL RATE OF PRODUCTION THIS MONTH (ADJUSTED):	870.6	1. Walton out sick 1 day.
(b) NUMBER OF WORKING DAYS THIS MONTH.	23	2. Smith on vacation.
(c) TOTAL MAN-DAYS WORKED (ADJUSTED), ITEM (b) X NUMBER OF SALESMEN:	230	3. Hill in training four days.
(d) AVE. WEIGHT POINTS PER DAY (ADJUSTED), ITEM (a) ÷ ITEM (c):	3.78	
(e) AVE. WEIGHT POINTS PER MAN (ADJUSTED) ITEM (a) ÷ NUMBER OF SALESMEN:	87.04	

Fig. 2. A Suggested Form for Recording Monthly Production of Salesmen. The Relative Rate of Production or Measure of Work Done Is Shown at the Bottom of Each Column Opposite Adjusted Total.

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Bell System Telephones Gain in 1934

There was an increase of 21,200 telephones in service in the Bell System in December, 1934, comparing with a gain of 13,000 telephones in the same month in 1933 and with 17,000 in November. Excepting June and July last year, gains have occurred in each month since August, 1933.

For the final quarter of 1934 telephone gains in the Bell System were 71,400, against 32,000 the year before and 38,000 in the third quarter of 1934.

For 1934 as a whole the gain totaled 298,000 telephones. This compares with a net loss of 630,000 stations in 1933. At the beginning of 1934 the Bell System had 13,162,000 stations in service, so that its total at the begininng of this year is 13,460,000.

The peak of Bell telephones in service was 15,800,000 reached in the early summer of 1930, and the low was 13,130,000 stations in August of 1933.

This Question of Depreciation

THERE has never been a better illustration of the necessity of practicality, common sense and flexibility in utility regulation than the attempt of the Interstate Commerce Commission, the Federal Communications Commission, and various state commissions to determine the amount of future depreciation on telephone properties.

Back in 1920, when Congress instructed the Interstate Commerce Commission to prescribe, as soon as practicable, the classes of telephone property for which depreciation charges might be included in operating expenses, and the percentage of depreciation that might be charged for each class, the telephone industry was experiencing a constant growth that had lasted continuously from the inception of the business.

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BEFORE the end of 1934, when the depreciation orders issued by the Interstate Commerce Commission were to become effective, the industry had suffered and was only beginning to slowly recover from the worst slump in its history. The situation of the industry had changed so vitally that any depreciation rates inflexibly fixed soon after 1920 would have been commercially disastrous to many telephone companies during the depression.

The situation is now such that any depreciation rates inflexibly fixed at present would either be commercially disastrous to many companies, or will be inadequate for the future.

It is true that the rates of depreciation so fixed are subject to modification from time to time to meet changing conditions, but such modifications can be made only with the approval of the commission concerned. In fact, the initial rate for each company cannot properly be established, nor can modification of it be made after it is established, without actual hearings by the commission concerned.

There being more than 6,000 separate telephone companies in the United States, it is clear that the process of holding hearings to establish the depreciation rate initially for each of them is an almost impossible burden upon the commissions; and, considering the rapidity with which conditions can change, it is also clear that it would be almost impossible to hold hearings rapidly enough and often enough to modify established depreciation rates so as to maintain them on a basis of fairness to the public and to the company at all times.

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NO ONE could foresee the depression, of course. Telephone associations and companies cooperated with the Interstate Commerce Commission in hearings upon and studies of depreciation. The results upon the industry of the depression not only made it apparent that the present is no time to even attempt to determine a depreciation rate that would be proper for so uncertain a future—at least for companies operating a limited amount of property—but also brought out many of the difficulties and even the absurdities and impossibilities of the whole proposition that were not discernible when the industry was constantly growing.

The United States Independent Telephone Association, in its brief filed with Federal Communications Commission prior to the hearing held by that commission last November on the new system of uniform accounts, asked that the effective date of the depreciation order, as applied to Independent telephone companies, be postponed, and that the whole question be opened up for further hearings and study in the light of present-day conditions.

The commission has recently issued an order postponing the effective date of the new system of accounts, including the depreciation accounting rules, another year. A few state commissions, however, still have orders outstanding on the proposition. One such order is general order No. 137 of Illinois Commerce Commission, which provides for certain filings to be made by Class A telephone companies in Illinois by January 1, 1935.

This commission has indicated that it will use these filings as the basis for determining future depreciation rates for these companies. The Illinois Valley Telephone Co. of Streator, Ill., filed on December 19 with the Illinois commission, a petition for indefinite suspension of general order No. 137, insofar as it applies to that company.

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THIS PETITION was printed in full in TELEPHONY last week. It sets out in a comprehensive and vigorous manner a number of reasons why it is not only impracticable, but impossible, to fairly and reasonably determine in advance a rate of depreciation on telephone property that can properly apply to a company operating a limited amount of property. It also recites some of the fallacies, absurdities and impossibilities of the whole proposition as applied to it and to companies of like size and circumstances.

The facts and reasoning submitted by the Illinois Valley company apply as well to similar companies in any state. The document deserves the careful attention of all telephone men and all state associations. This question of depreciation is far more important, and any summary and perhaps arbitrary settlement of it is far more dangerous to the telephone industry and its patrons, than it may seem on the surface to be.

A wrong guess—and the determination now of a depreciation rate for the future is, at best, a guess—may not only make it impossible for a company to keep its plant abreast of the developments of the art, in which case the service to the public would be impaired, but may also result in serious and irreparable financial distress of the company.

Solution of Direct-Current Circuits

By ARTHUR L. ALBERT

Associate Professor, Communication Engineering, Oregon State College, Corvallis, Ore.

THE SECOND ARTICLE in a series on fundamental principles of electricity involved in the operation of telephone equipment. How simple problems involving direct-current circuits are solved

THE laws governing the flow of direct current were considered in the preceding article. These laws should be carefully studied and thoroughly mastered before continuing this series. This article will explain how simple problems involving direct-current circuits are solved.

Before taking up the solution of the circuits, however, an introductory statement should be made regarding the types of circuits which will be encountered. There are two fundamental types of circuits—the *series* circuit, and the *parallel* circuit.

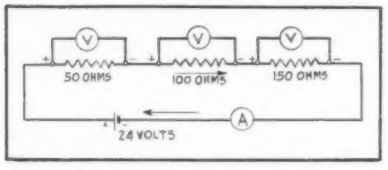

Fig. 1. Connection of Resistors in a Series Circuit.

As the term "series" indicates, the elements or units, such as resistors, are connected one to another as Fig. 1 indicates. As implied by the term "parallel," the corresponding terminals of the units are connected to common points as shown by Fig. 2. Any electrical circuit, no matter how involved it seems, can be analyzed into series and parallel combinations.

The Solution of Series Circuits: When a number of electrical devices or elements are connected in series, the same current of electricity must flow through each. Thus, a fundamental law of the series circuit is as follows: *The current in all parts of a series circuit is the same.*

These relations are illustrated by the series circuit of Fig. 1. The ammeter, A, indicates the total current in the circuit, and this same value of current flows through each of the resistors. The voltmeters, V, indicate the *IR* or voltage drop across each resistor.

To find the current flowing, first add the values of all the series resistors and divide this amount into the battery voltage. Thus, $I = E/R = 24/(50+100+150) = 24/300 = 0.08$ ampere, or 80 milliamperes.

The *IR*, or voltage drop indicated by the voltmeter across each resistor, will be $E = IR = 0.08 \times 50 = 4$ volts; $0.08 \times 100 = 8$ volts; and $0.08 \times 150 = 12$ volts.

In the calculations just made it should be noted that the total of the voltage or *IR* drops across the series elements equals the impressed battery voltage. This is another important law governing series circuits: *In a series circuit the sum of the voltage drops across each element equals the impressed voltage.* In other words, the electromotive force or battery voltage is all used up in forcing a current of electrons through the resistance of the circuit.

The amount of voltage required to force the current through each element equals the *IR* drop across that element. Since they are in series and the current is the same, the magnitude of the voltage is determined by the resistance of each.

The arrows in Fig. 1 show the conventional direction of current flow. This direction is from positive to negative, or from plus to minus. Thus, the *IR* or voltage drop across each part of the circuit has a direction, and these are shown by the plus and minus signs. If the battery is reversed, the current will be reversed, and the plus and minus signs will be interchanged.

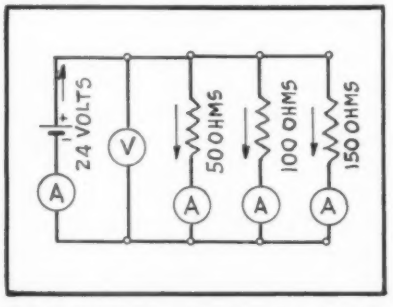

Fig. 2. Connection of Resistors in a Parallel Circuit.

The Solution of Parallel Circuits: When a number of electrical devices or elements are connected in parallel, a different current of electricity *may*

Answers to Questions In First Instalment

Here are the answers to questions, problem No. 1, concerning principles of electricity given in the first article of this series, entitled, "The Flow of Direct Current":

A. $I = 24/2570 = 0.0093$ ampere, or 9.3 milliamperes.

B. Voltage across transmitter $= 50 \times 0.0093 = 0.47$ volt.

Voltage across receiver $= 275 \times 0.0093 = 2.56$ volts.

Voltage across relay $= 2000 \times 0.0093 = 18.60$ volts.

C. Power dissipated in transmitter $= 0.47 \times 0.0093 = 0.004$ watt.

Power dissipated in receiver $= 2.56 \times 0.0093 = 0.024$ watt.

Power dissipated in cable $= 255 \times 0.0093 \times 0.0093 = 0.022$ watt.

Power dissipated in relay $= 18.6 \times 0.0093 = 0.173$ watt.

Power delivered by battery $= 24 \times 0.0093 = 0.223$ watt.

D. The difference between this sum and the 24 volts applied to the circuit is 2.37 volts. This is the value of the voltage drop due to the resistance of the cable.

flow in each branch, but the voltage across each branch must be the same. Thus a fundamental law of the parallel circuit is as follows: *The voltage across each branch of a parallel circuit is the same.*

These relations are indicated in Fig. 2 and, assuming no IR drop in the connecting wires, the voltage across each branch is the same as that of the battery. (If the resistance, and hence the IR drop, in the connecting wires is not negligible, it is a series-parallel circuit). The currents in the various branches as indicated by the ammeters, A, may be different, depending on the resistance of each branch.

Suppose that it is desired to find the current in each branch of Fig. 2. The current in the first branch will be $I = 24/50 = 0.48$ ampere. The current in the second branch will be $I = 24/100 = 0.24$ ampere. The current in the third branch will be $I = 24/150 = 0.16$ ampere. The total current through the battery will be $0.48+0.24+0.16 = 0.88$ ampere.

This illustrates another law of parallel circuits: *In a parallel circuit, the sum of the currents in each branch equals the total line current.*

The total current flowing through the battery was shown to be 0.88 ampere. If this current is divided into the battery voltage, a value of resistance is obtained. What is the significance of this value of resistance? Thus, $R = E/I = 24/0.88 = 27.3$ ohms. This resistance is the *equivalent resistance* of the parallel circuit. It is the value of resistance which, if substituted for the combination consisting of the three parallel branches, will take the same current from the battery and is, therefore, *equivalent* to the parallel group.

It has been shown that in a parallel circuit the branch currents should add to give the total current. Thus, since $I = E/R$, it can be written that $24/27.3 = 24/50 \times 24/100 + 24/150$. The 24-volt battery is common to each branch and to each term, and can be removed, giving $1/27.3 = 1/50+1/100+1/150$, and this is true since $0.0366 = 0.02+0.01+0.066$. Therefore, in general terms it can be written that

$$1/R_e = 1/R_1 + 1/R_2 + 1/R_3, \text{ etc.} \quad (1)$$

and that

$$R_e = \frac{1}{1/R_1+1/R_2+1/R_3}, \quad (2)$$

where R_e represents the equivalent resistance of the parallel circuit.

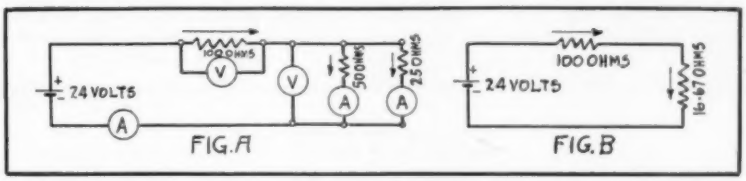

Fig. 3. Series-Parallel Circuit and Same Circuit Which Has Been Reduced to an Equivalent Series Circuit.

To check this last expression, from Fig. 2, $R_e = 1/(1/50+1/100+1/150) = 1/0.0366 = 27.3$ ohms, and this was the value of the equivalent resistance previously found by dividing the total current into the impressed battery voltage.

Conductance in Direct-Current Circuits: Resistance is the opposition a circuit offers to the flow of electricity. The reciprocal of resistance is called *conductance*, and is the *ease* with which a current flows. Conductance is represented by g, and from the definition,

$$g = 1/R \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Since it is the opposite of the resistance in ohms, conductance is measured in mhos. Applying this last relation to equation (1) gives

$$g_e = g_1 + g_2 + g_3, \text{ etc.} \quad \ldots\ldots\ldots\ldots \quad (4)$$

Thus, in a parallel circuit the equivalent conductance is the sum of the conductance of each branch. The reciprocal of the equivalent conductance gives the equivalent resistance of the parallel circuit.

The Solution of Series-Parallel Circuits: A circuit of the series-parallel type is shown in Fig. 3-A. Suppose that the current in each branch and the voltages indicated are desired. To solve this circuit, the first step is to find the equivalent resistance of the parallel part, and this will be done by the use of equation (4). Thus, $g_e = 1/50 + 1/25 = 0.02+0.04 = 0.06$ mho. The equivalent resistance is $R_e = 1/g_e = 1/0.06 = 16.67$ ohms.

The circuit of Fig. 3-A can now be reduced to Fig. 3-B, and this is a series circuit. The total current through the 24-volt battery can now be found. It is $I = 24/116.67 = 0.206$ ampere. The next step is to find the IR drop across the 100-ohm resistor. This is $0.205 \times 100 = 20.6$ volts.

If this value is required to force the current through the resistor, the voltmeter across the parallel part of the circuit will indicate $24-20.6 = 3.4$ volts, and this will be the voltage across the 50-ohm and 25-ohm resistors.

The current through these will be $I = 3.4/50 = 0.068$ ampere, and $I = 3.4/25 = 0.136$ ampere. It should be noted that the sum of the currents through the parallel resistors equals the total current previously computed.

Solution of a Typical Telephone Circuit: The simplified portion of a common-battery telephone circuit shown in Fig. 4-A is of the series-parallel type. The ringer, induction coil secondary, and receiver are in

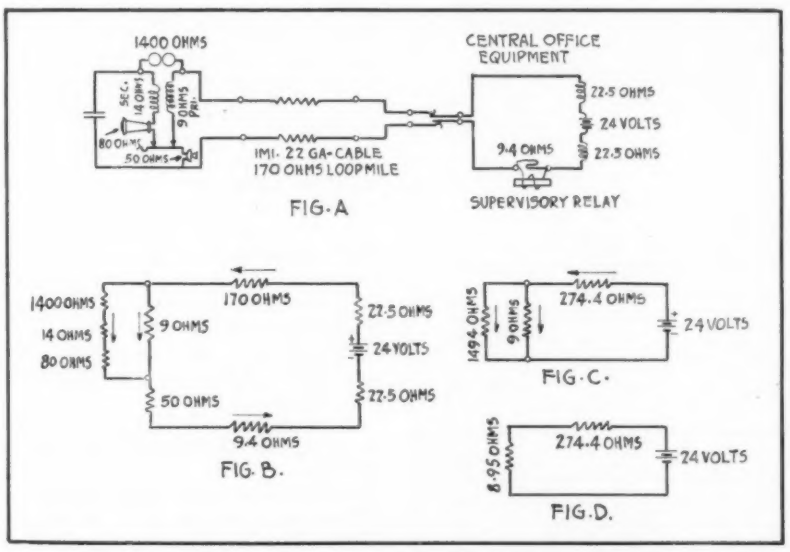

Fig. 4. Simplified Portion of Common Battery Circuit of Series-Parallel Type With Further Simplification to Find Current Through the Transmitter.

parallel with the induction coil primary, and this parallel combination is in series with the line, relay, and repeating coil.

Suppose that it is desired to find the current through the transmitter. The first step is to simplify the circuit as much as possible, which has been done in Fig. 4-B. The condenser has been omitted since it does not pass direct current. The transmitter line, supervisory relay, and the two windings of the repeating coil are in series, giving a total resistance of 274.4 ohms. The ringer, induction coil secondary, and receiver are in series, making a total of 1494 ohms across the 9-ohm primary winding as shown in Fig. 4-C.

The equivalent resistance of the parallel circuit of the subscriber's set must now be found. This can be done by equations (1), (2), or (4). Using equation (4), and the relation $g = 1/R$, $g_e = 1/1494 + 1/9 = 0.00067 + 0.11111 = 011178$ mho. Since $R = 1/g$, $R_e = 1/0.11178 = 8.95$ ohms.

It is evident that the parallel part consisting of the ringer, coil, and receiver, does not greatly affect the circuit. The circuit can now be redrawn as in Fig. 4-D.

The current through the transmitter can now be found. Adding the 8.95 ohms' equivalent resistance of the subscriber's set to the 274.4 ohms of the rest of the circuit gives 283.35 ohms. The current flowing will, therefore, be $I = E/R = 24/283.35 = 0.0847$ ampere or 84.7 milliamperes.

Summary: The current is the same in all parts of a series circuit. The sum of the different IR or voltage drops in a series circuit equals the impressed voltage.

The voltage is the same across each branch of a parallel circuit. The sum of the currents in each branch of a parallel circuit equals the line current flowing through the source.

To solve a series-parallel circuit, combine the circuit elements as much as possible by adding all *series* resistances, and draw a simplified diagram. Find the equivalent resistances of all parallel portions. These equivalent resistances are then in series with the rest of the units, and the circuit can then be solved by Ohm's law.

Problem 2: Two subscribers' sets such as shown in Fig. 4 are connected in parallel at the ends of the two line wires of Fig. 4; that is, they are bridged across the line. The current through each transmitter, and thus the transmitting efficiency, is therefore decreased.

Questions: A. Determine the equivalent resistance of each subscriber's set.

B. Compute the equivalent resistance of the two subscribers' sets in parallel.

C. Find the equivalent resistance of the entire circuit.

D. Calculate the current flowing through the central-office battery.

E. Determine the current through each transmitter.

F. Calculate the current flowing through each receiver.

Work out the answers to these questions and hold them to compare with the correct answers. These will be published with the next instalment of this series of articles on electrical fundamentals written for the telephone worker.

REPUTATION

By MISS ANNE BARNES,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

We are largely responsible for our reputation, be it good, bad or indifferent. We can destroy a good reputation or change an indifferent one to a good one, as we will.

Character is what you really are, while reputation is what others think of you. Occasionally a man or woman of good character suffers unjustly from a bad reputation. On the other hand, one may undeservedly enjoy a good reputation for a time. Generally speaking, however, good character is reflected in a good reputation, and, conversely, a good reputation is built upon character.

To illustrate, I shall tell you a story.

Once upon a time, in a little village off the New England coast, there lived a young man who was a carpenter by trade. Although work was often scarce at Hocum, his hands were seldom idle. When there was a great deal of carpenter work to be done, people preferred to wait for him rather than hire someone else. His handiwork might be seen both inside and outside of most homes. If someone commented upon a beautiful doorway, straight and wide, or a restful-looking porch, the usual comeback was: "That is the handiwork of Mr. So and So, one of our residents."

It happened one day that a very wealthy man from the city came down to Hocum to look at a cottage near the sea where he wished to establish his family for a while. He wanted some carpenter work done, so he asked a business man if he knew of a carpenter he could get to do a little repair work on the fence. The man told him about this young carpenter and he was sent for. Not being busy at the time, he came at once.

After looking over the fence, the young man reported its condition to the rich man. He also estimated the material and time required to put the fence in first class condition.

But the rich man told him he was not particular about the looks of the job as he intended to cover it with vines. He told him to simply repair it, using the old posts and nailing up the loose palings. He told the young carpenter he would pay him ten dollars for the job.

The rich man returned just after the young carpenter had finished his work. Instead of appearing satisfied with the very careful repairing and bolstering-up of the once-wabbly fence, the rich man censured the young carpenter for spending so much time and care on a fence which would soon be covered with vines.

The young carpenter replied that behind the vines would be his handiwork and no matter how thickly the vines would grow, they could not make him feel satisfied with anything less than a neat and reliable piece of carpenter work underneath, even though it was only repair work.

Upon this explanation, the hard-headed city man was very favorably impressed with the conscientious performance of the young carpenter, and insisted upon paying him an additional ten dollars for the moral principle he built into the fence.

If we develop our character as we work, we have little to fear concerning our reputation.

Personal and Obituary Notes From the Field

John P. Boylan, president of the Rochester Telephone Corp., Rochester, N. Y., is president-elect of the Rochester Chamber of Commerce. He will be installed, with other officers chosen on December 17, at the annual meeting of the organization on January 21.

Mr. Boylan's elevation to the highest office in the Rochester Chamber of Commerce came as a birthday present. He celebrated his 58th birth anniversary on December 19.

The first tribute to Mr. Boylan in recognition of his election to the presidency of the local organization was paid him at a hilarious luncheon in the Chamber on December 18.

The occasion was the annual Christmas party of the Mixed Nuts, a Chamber luncheon club with 40 members, but no officers or directors. The club's closest approach to any sort of management is a special entertainment committee appointed whenever occasion requires.

The Chamber presidency marks the 22nd position of trust and responsibility now held by Mr. Boylan in various Rochester commercial and civic enterprises, including five presidencies.

He is president of the Rochester Community Chest, the Rochester Telephone Realty Corp. and of the Up-State Telephone Association of New York. In addition, he is a director of the Lincoln-Alliance Bank & Trust Co., Rochester Gas & Electric Corp., Automobile Club, Red Wing Baseball Club, Mechanics Institute and other institutions and clubs.

A native of Cleveland, Mr. Boylan began his career at the age of 17 as a timekeeper with the Cleveland Telephone Co., worked up through the grades in Cleveland and Detroit until he was named vice-president and general manager of the Northern New York Telephone Co. at Plattsburgh, N. Y. He accepted a similar position with the Rochester Telephone Corp. in 1921, becoming its president in 1927.

Charles E. Wilde, general agent of the Michigan Bell Telephone Co., Grand Rapids, Mich., has retired after a record of 50 years of continuous service in telephone work. He was recently presented with a 50-year service button by the company, and a dinner was given in his honor at the Peninsular club in Grand Rapids shortly before Christmas.

Mr. Wilde was born on a farm in Kalamazoo county on December 25, 1869. He entered the telephone business at the youthful age of 15, becoming an operator at Petoskey, Mich., on November 13, 1884. He was manager there when 17 years of age, and in August, 1889, at the age of 19, he was promoted to the managership at Battle Creek. Later he was transferred to Alpena as manager. He became manager for Muskegon and Grand Haven in 1892 and two years later went to Kalamazoo which had one of the largest exchanges then in existence.

Mr. Wilde became superintendent of the southern division branch, comprising St. Joseph, Calhoun, Kalamazoo, Berrien, VanBuren and Cass counties, with headquarters in Kalamazoo, in 1899, and in 1902 became superintendent of the upper peninsula division with headquarters at Marquette, establishing new exchanges and building a toll line system, the basis of the present system.

He went to Grand Rapids in 1904, was made division manager in 1923 and general agent in 1926. Mr. Wilde was identified with the purchase of the Citizens Telephone Co. by the Michigan Bell company.

He became general agent in July, 1926, which position he held at his retirement.

Frank Binkley, general manager of the United Telephone Co. of Bellefontaine, Ohio, left recently for a motor trip to the Pacific coast. On New Year's day he attended the Rose Bowl football game. Following that event he planned to visit several points of interest on the coast.

G. M. Welch, Newly-Elected President of Michigan Bell Telephone Co., with Headquarters in Detroit, Has Been with the Company 25 Years. From 1916 Until His Recent Promotion He Served as Vice-President and General Manager. Prior to His Service with the Michigan Bell, Mr. Welch Was with the Northwestern Bell.

T. N. Lacy, Who Is Now Vice-President and General Manager of the Michigan Bell, Served as Chief Engineer for Past Nine Years. These Changes in the Michigan Bell's Personnel, Together with Notice of the Retirement of Burch Feraker as President, Were Noted in Detail in TELEPHONY of October 20, 1934.

George B. Wellbaum, general information director of the New York Telephone Co., and former publicity director of the Indiana Bell Telephone Co., who has been seriously ill in the New York Hospital, New York City, is reported on the road to recovery. He suffered a stomach disorder several months ago and underwent two major operations, the first in early December.

Joseph White, senator from Jamaica Plain, Boston, in the Massachusetts legislature, has been named director of the department of telephones and telegraphs by the Massachusetts Department of Public Utilities. He succeeds

William H. O'Brien, who recently retired from the public service after some 20 years of distinguished activity in connection with the regulation of communications in the state.

William E. Lyons, of Lancaster, Ohio, district commercial manager of the Ohio Bell Telephone Co., passed the 35th mile-stone in his telephone career last month. In 1899 he accepted his first telephone job as a collector with the Central Union Telephone Co., at Toledo. Since that time his telephone service has been unbroken. In recognition of his 35-year record, the Ohio Bell company presented him with a diamond studded service pin.

After his initial job, his advancement was rapid with frequent promotions in both the commercial and plant departments of the company. In January, 1907, he was made manager at Fremont, Ohio. He also served in the same capacity in Piqua and Coshocton before going to Lancaster.

P. M. Watson, who since March, 1922, held the position of Indianapolis division commercial superintendent of the Indiana Bell Telephone Co., has been appointed assistant secretary and assistant treasurer of the company.

Russell R. Hirschman, of Indianapolis, Ind., has been appointed division commercial superintendent of the Indiana Bell Telephone Co. effective January 1. He formerly was supervisor of commercial training in the Indianapolis general offices.

Mr. Hirschman began his telephone career in March, 1927 as commercial agent at South Bend for the Indiana Bell. He was transferred to Indianapolis in the same capacity November 1 of that year. Two years later he was promoted to division sales supervisor and later was transferred to Kokomo as district commercial superintendent. He returned to Indianapolis in August, 1933.

John H. Corcoran, of San Francisco, Calif., vice-president and general manager, northern California area, of the Pacific Telephone & Telegraph Co., retired on December 1 after 47 years of service in the field. **Mark R. Sullivan,** general traffic manager of the northern California area, will succeed Mr. Corcoran.

Mr. Corcoran began his telephone career as an office boy in San Francisco in 1887 when there were only 2,291 telephones in the city and 150 telephone employes. He advanced through the ranks to the position he held upon retirement, and today the telephones number approximately 239,000 and the employes 4,600, it is stated.

In turn Mr. Corcoran held the positions of repairman, installer, wire chief, manager, general superintendent, and vice-president and general manager.

Mr. Sullivan, who is 40 years of age, was born in Oakland. He obtained his education in the public schools and worked his way up through the ranks, starting as clerk in 1912.

Obituary

Burt E. Forbes, age 62, chief engineer of the Nebraska State Railway Commission since 1914, died January 2, after an illness of three months. Mr. Forbes was personally known to nearly every telephone executive in the state, and was ranked as an expert on valuations.

He had lived in the state for 53 years, graduating from the University of Nebraska in 1895. He taught engineering in the Beatrice high school, later being named as assistant state engineer. Six years were spent with the United States Reclamation Service, and this was followed by connections with various engineering projects in midwestern states until 1914, when he was placed in charge of the engineering department of the state railway commission.

Mr. Forbes was held in high esteem because of his fairness and integrity. Both branches of the state legislature passed memorial resolutions attesting to his ability, loyalty and devotion to the public interest. Regret at the loss of a man of this type of public servant was expressed in them.

The resolutions recited his high qualifications for the office he held and said that he "rendered valiant service to the citizens and taxpayers of the state and to committees of this legislature whenever they were confronted with technical public service problems. A brave, loyal, fearless, honest and faithful public servant has left us."

Mr. Forbes' remains were taken to his old home in Beatrice for interment, a large number of fellow citizens accompanying the funeral cortege. Rev. Paul C. Johnston, of the Westminster Presbyterian church, to which Mr. Forbes belonged, paid him a high tribute for the fine qualities of manhood he had displayed, even though he was a modest man who sought no limelight.

Frank Strangeman, 70 years old, a pioneer telephone man and for 20 years general foreman of the cable division for the Illinois Bell Telephone Co., died in his home in Chicago on January 7.

Mr. Strangeman was superintendent of construction for the first telephone service in four Ohio cities, East Liverpool, Findlay, Mansfield, and Massillon, between 1899 and 1901.

He is survived by his widow, one daughter and four sons.

Hermann Kraft, for nearly half a century an employe and official of the Southern New England Telephone Co., died on December 28 of a heart attack at his home in New Haven, Conn. He had been ill several weeks. He was 62 years old.

A skilled financier, Mr. Kraft had been auditor and supervisor of methods and had held several positions in the financial department of the company. He completed 49 years of service with the company last October. He was one of the few survivors of the group of boys who manned the telephone switchboards before the advent of women as operators.

He was president of the Telephone Society of New Haven and was active in several fraternal organizations. He was born in Germany. He became a messenger boy for the New Haven Telephone Co. in 1885.

Robert W. Devonshire, of Dorchester, Mass., former vice-president of the American Telephone & Telegraph Co. and the first employe of the Bell System, died on January 6 at the age of 80. He was hired a month after the telephone patent was acquired by the Bell company and remained in its service for 52 years.

Mr. Devonshire was born in Boston. When he was engaged as bookkeeper for the Bell company, Alexander Graham Bell, Thomas Sanders, Gardiner G. Hubbard and Thomas A. Watson, the owners, had put the business into the form of a trusteeship.

He became chief clerk of the successive parent telephone companies. In 1906 he was appointed general manager of the American Bell Telephone Co., and seven years later vice-president of the American Telephone & Telegraph Co. He was an incorporator of the National Bell Telephone Co. in 1879 and of the American Bell Telephone Co. in 1880.

In recognition of his long term of faithful service a testimonial dinner was given Mr. Devonshire at Salem in August, 1927, by leading telephone officials.

Frederick Hayes Wilkins, an executive of American and European telephone manufacturing companies, died on December 24 after a long illness in New York Hospital, New York, N. Y. He was 73 years old.

Mr. Wilkins was born at Sennett, N. Y., attended schools at Rose, N. Y., the Rochester (N. Y.) Free Academy and was graduated from the University of Rochester in 1882. Joining the Western Electric Co., he served as an assistant manager for several years and in 1911 was appointed its general manager in Europe.

In Europe and England Mr. Wilkins became a leader in his industry and later was elected a vice-president for London of the International Telephone & Telegraph Corp.

He was also a director of the Western Electric Co. of London, Ltd., the Bell Telephone Mfg. Co. of Antwerp and the Sperry Gyroscope Co., Ltd., and was active in other European and American companies.

Here, There and Everywhere

Overseas Holiday Traffic Sets New Record

New Year greetings to foreign lands by telephone reached the highest figure in the history of the Bell System's overseas service. A total of 172 conversations were handled on New Year's eve and New Year's day at the foreign service switchboards in New York City, San Francisco, Calif., and Miami, Fla., uniting American subscribers with friends and relatives in Palestine, South Africa, Japan and many other distant lands.

The New Year's traffic brought the grand total for the two perennial peaks at Christmas and New Year's to an all-time high. During the four days comprising these holidays a total of 565 calls were completed, against 509 the year before. Americans again appeared more telephone-conscious than people abroad, a majority of the calls being outward. A number of long conversations were held, one of them lasting for 40 minutes.

A large proportion of the calls across the Atlantic were to London. Paris and Rome also had a substantial number of calls. "Christmas traffic" actually began on Christmas eve, as some American subscribers discovered upon receiving calls from the Far East, where Christmas Day arrived 14 hours before it reached New York.

While comparatively few ships were on the high seas over the holidays, a number of calls were handled with ships. On New Year's eve alone 27 conversations were held with the Monarch and Queen of Bermuda, Ile de France, Europa and Aquitania. Other ships which had traffic during the holidays were the Empress of Britain and the Olympic. In some cases the ships were practically in New York harbor while in others they were half-way across the Atlantic.

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Nebraska Association's Convention Plans

Mayor Fenton B. Fleming, new mayor of Lincoln, Neb., will deliver the address of welcome at the annual convention of the Nebraska Telephone Association at the Hotel Lincoln, February 13 and 14. Secretary George M. Kloidy has not yet finished the program for the meeting, but announces that because of the great economic changes it has been deemed advisable to secure several outstanding speakers to discuss the situation.

The opening convention session will be held Wednesday afternoon, at which reports from the officers will be submitted and several addresses delivered. Thursday morning there will be reports of committees, a memorial service and addresses. In the afternoon a round table at which telephone problems will be presented and discussed will be held; and in the evening there will be a banquet, featured by entertainment numbers and followed by dancing. A special program for the ladies has also been arranged.

The 1935 convention will be the 36th in the history of the association, and Secretary Kloidy says the program has been deliberately planned so that those in attendance may take back with them a better understanding of the times and their problems and much valuable information that will fit in with their own situation.

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Ohio Bell Reports 1934 Telephone Gain

Showing a yearly gain for the first time in four years, the Ohio Bell Telephone Co. added approximately 19,000 telephones throughout the state during 1934.

The upturn in telephone installations started in August, 1933, and has been maintained since that time, except for small seasonal losses. Despite gains in the last five months of 1933, there was a loss of 40,000 stations for that year as a whole because of heavy losses during the first seven months. During 1934, however, there were consistent gains throughout the year. Telephones were added every month, except in June and July, which normally are affected by seasonal trends.

From the peak development in April, 1930, to the low point in July, 1933, the Ohio Bell lost more than 196,000 telephones. The gains made in the last five months of 1933 and in 1934 represent the recovery of 13 per cent of this loss.

Thanks for the Compliment!

In a letter extending holiday greetings to TELEPHONY, C. F. Mason, president of the Associated Telephone Co., Ltd., of Long Beach, Calif., says:

"It would be superfluous for me to say that TELEPHONY has done more for the Independent telephone field than anything of which I know, and personally I look forward to the receipt of your magazine more than any other I receive. I hope 1935 will be your banner year."

While TELEPHONY is not optimistic enough to expect 1935 to be its banner year, this journal is sincerely glad to receive such a fine tribute from a man who stands as high in the telephone industry as does President C. F. Mason.

• • •

"Tillie Fone" Saves a Disconnect for a Customer

I have often heard people say that you can talk better and you can sell more concerning something that you know the most about. An experience I had last week served to bear out the truth of that assertion.

A customer came into the office and asked that his telephone be disconnected. I gave him all the reasons I could as to why he shouldn't have his telephone removed. His reply was as follows:

"I agree 100 per cent with all you say about the value of my telephone, and I would like to keep it; but it is just impossible, because I don't have the money to pay for it."

That was the way the customer summed up his reasons for not keeping the telephone, and it began to look as though my efforts to save this disconnect were not to be successful. I talked with the customer for a few minutes, longer, whereupon he mentioned the fact that the telephone had been of real service to him.

"You know," he said, "I have a son employed at Marshall and he often calls us, and we sure do enjoy hearing his voice."

Well, that was just the cue I needed. As soon as the conversation was over and the customer had left the office, I asked the manager if I could make a long distance call to Marshall and possibly save a disconnect. Of course he O.K.'d that call.

I talked to the son, explained the situation and reminded him of the pleasure that he had in talking to his parents. I soon found that he was a very busy man, and I reminded him of that point: that it was so much easier to telephone his parents rather than write them. Then, too, I reminded him that his parents would rather hear his voice—he was an only son, you see.

I suggested that if he wished, the bill

(*Continued on page* 24)

"My telephone finds the highest prices"

"People who just take a load of chickens to town have to be satisfied with what they get for them," says a farmer near Medford, Oklahoma. Instead, he uses the telephone to find out where he can sell to best advantage.

This is another of the innumerable instances where the value of the telephone can be measured in dollars and cents. But it has also a value that cannot be measured in money — that of keeping the family in constant touch with friends and relatives. And its service is priceless in time of emergency —when fire, theft, illness, accident comes to your door or that of a neighbor.

BELL TELEPHONE SYSTEM

FARMERS WRITE THEIR OWN ADVERTISING FOR THE TELEPHONE

Advertising drawn directly from the lives of its readers is likely to be natural, believable. Telephone advertising in farm publications is really written by the farmers themselves. Actual instances of the telephone's usefulness, reported by rural subscribers, form the basis for each advertisement. • Some advertisements, like the one on the opposite page, show how the telephone can be profitably applied to the business of farming. Others are devoted to the human values of the telephone to farm families. • Simple, authentic advertising of this type, appearing month after month, should help to hold present farm subscribers and win new ones for telephone companies everywhere.

An Advertisement of the Bell Telephone System

(*Continued from page* 21)
for telephone service might be sent to him. The son readily agreed to pay the bill. Then he gave me the address to which the bills should be sent, and thanked me for being so thoughtful.

When I got through with the interview and had an O.K. for the continuation of the service, I called up the father and told him that the son had arranged for the telephone service to continue. The father was overjoyed. He said he had wanted to keep the telephone but he hesitated to ask his son to pay for it. He also thanked me for my efforts in his behalf.

When I told the manager what had happened, he had this to say:

"You see, Miss Fone, people really do thank you when you sell them something that they can use and that they need and for which they pay so little and receive so much.

There was another lesson in that interview, Miss Fone, and it is this: Now that you have used the long distance to secure a sale, don't you think you are better equipped to talk to some of our customers about the value of long distance calls and how a telephone call can help them to contact their customers in other cities and make sales."

So you see, even when you are making a sale you are also making people grateful to you, and you are learning something about sales. It seems to me that every contact that I have teaches me more about selling telephone equipment and service.

Ship of Prosperity Will Return; Prepare for a Safe Landing

By Joseph Edwards,
Manager, Mosinee (Wis.) Telephone Co.

California to Wisconsin by wire is something to think about. How many of us in the telephone business have really gone into this mystery and really understand why it is that the human voice spoken into a simple device known to us as a transmitter is carried miles and miles through space? Whether or not we understand it, we participate in making this marvel possible.

When it is evening in Sacramento, at the end of a pleasant day someone steps to the telephone, tells the operator who responds to the signal that he desires to talk to So-and-So who lives on a farm near Mosinee, Wis. The California operator—in a land of sunshine and roses—with speed and precision, contacts the operator in far-off Mosinee—in a land of snow and ice. The latter, upon receiving the proper information, completes the connection with the called subscriber residing on a farm many miles from the local telephone office.

"Sacramento, California, is calling you," she says. "Just a moment, please."

In a few moments voices are heard. Recognition is instantaneous. Sunshine and gladness enter the hearts of beloved friends or relatives, separated physically by thousands of miles of space, but with their personalities in intimate contact as the conversation continues uninterruptedly. Marvelous, indeed, are the works of men!

Long distance telephone service is all the more wonderful when we look back over the road many of us once traveled—back to the birth and infancy of the telephone transmitter and receiver. And to think that all this development in wire communication came about within the lifetime of many now engaged in the industry.

Old Rip Van Winkle of the 20th century went up into the mountains and slept. After experiencing Heaven's great purifier and contacting the strange beings that made lightning and thunder, he awoke (seemingly from his usual spree) to see that the young sapling beside which he had fallen asleep was now a full-grown tree, and to stumble upon the bones of the skeleton of his faithful dog, bleached by time. His gun, clothing, long white beard and the sun were the only evidences of his great sleep.

Wandering back to the village, he finds that the home which was once equipped with a large wall-type telephone is now equipped with a neat and handsome desk set. One no longer has to turn the crank to summon Central. All one needs to do is to lift the receiver from the switchhook.

When calling on his neighbors, Rip Van Winkle finds that many of them have handset telephones. They thought the desk set telephone out of date. Some had even secured telephone sets to harmonize with their decorations and furnishings. Everyone, it seemed, had telephone service.

By and by we, too, fell asleep—on the Mountain of Prosperity. In the course of time we awoke—to find that the tide had gone out, leaving a dark, barren waste over the vast land. The darkness continued for months—even years. During that desolate period the Ship of Prosperity attempted a landing several times, but was unsuccessful because of the low ebb of the tide the world over.

Some day there shall be flood tide. Set out to prepare for it. Build up that pole line that is so badly in need of repair, even though it is now only serving a few subscribers. Be prepared for the time when the Ship of Prosperity returns for another attempted landing. Do your part to see that the landing is successful this time.

• • •

Convention of Texas Association in Dallas

The Texas Telephone Association announces that its next annual convention will be held in the city of Dallas, March 25, 26 and 27. Arrangements for the program are going forward under the direction of Managing Secretary H. M. Stewart, of Austin, Texas. Further announcements will be made at a later date regarding the hotel and program.

• • •

Progressive Company's Newspaper Advertising

The newspaper advertising program for 1935 of the Lincoln Telephone & Telegraph Co., Lincoln, Neb., will embrace more space than has ever been used by the company. Over 100 newspapers will carry the telephone sales story. The first of the 1935 series will be released for publication on January 15.

While no statement was made concerning the details of this year's campaign it was indicated by C. W. Motter, publicity director for the company, that it would be built around the theme of the low cost, speed, ease, dependability and clearness of today's long distance telephone service. The insertions are two columns wide and will range from six to ten inches in depth.

In one of the advertisements in which the face of a clock is pictured, the following copy is featured: "In 1920—8 minutes; in 1926—two minutes; in 1930—90 seconds; today 72 seconds. That's what we call hi-speed service. Today you can reach points 20—40—or even

hundreds of miles away just like a local call. You even don't have to hang up your receiver."

In addition to this campaign to stimulate the widespread use of long distance service, the company will have special campaigns. These campaigns are based on a cooperative plan to help retail business subscribers to promote the use of the telephone in merchandising, to impress the general public with the convenience of marketing by telephone, and to give increased value to both merchant and user of telephone service.

• • •

Last Year's Construction Of Northwestern Bell

The Northwestern Bell Telephone Co. reports that between January 1 and November 30, 1934, there was an increase of 16,322 in the number of stations operated by the company in the five states it covers, Nebraska, Iowa, Minnesota and the Dakotas.

While the building program for the year was restricted, a number of new buildings were constructed and central office equipment replaced new apparatus. In Nebraska, buildings were constructed at Gordon, Wayne, Valentine and Tekemah. Work at Gordon has been completed, and the new building and equipment are in service. At the other three points the new equipment is to be placed during the first quarter of this year.

The company had to expend a considerable sum during the year in relocating pole lines, due to the large amount of state and federal highway work done and to the fact that at several points the government is engaged in beautifying entrances to the cities and landscaping, which usually called for relocation of pole lines.

At Omaha, Neb., a half-million dollars are being spent on a project that will make Dodge street the main entrance from the west. This compelled the telephone company to expend $85,000 for its part of the work of widening and relocating pole lines.

• • •

How Hungarians Keep Service Rates Down

A newspaper dispatch recently from Budapest, states that the Hungarian Telephone Administration has a regulation providing that whenever the number of subscribers in a country district reaches 100, the rate shall be doubled.

In two areas the limit was reached recently and subscribers were notified that their fees would be 12 pengoes a month instead of the former 6-pengo rate.

The subscribers held a meeting and agreed to a method to determine which one of them should give up the service each year in order to keep the rate at the old figure.

She doesn't know . . .

. . . the why's and wherefore's of all the marvelous little gadgets necessary to make her call. She doesn't care! All she wants is to get a message to the doctor quickly . . . clearly!

You do know however, that to put her call through every piece of exchange equipment must do its job without fail; and that it must be built to render many years of satisfactory service at reasonable cost.

For more than 40 years Exide Batteries have been rendering satisfactory service in telephone exchanges in every part of the country. There is an Exide for every telephone battery job . . . common battery, emergency reserve, signalling or P.B.X.

Typical cell of the Exide-Chloride Battery showing its construction

Exide
BATTERIES
FOR EVERY TELEPHONE USE

NRA CODE

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Plant Men "Swap" Ideas

Useful Ideas: Cleaning Oil from File Grooves

Oil is often accidentally spilled onto files lying around the work bench or on the job. It is indeed hard to clean it out with any means usually available. A simple method is shown in the accompanying illustration:

Saw a block of paper out of the back of any old pulp or soft paper magazine, making the block about one and one-half inches wide and about three inches long. Work this pad or block of paper firmly down and across the teeth as shown in the photograph reproduced.

The absorbent blotter-like nature of the cut face of the block will easily and absolutely remove all the oil from the teeth and the grooves of a file, no matter how small.

Block of Soft Paper Provides Simple Method of Cleaning Oil Out of Grooves of Files.

• • •

Four Accidents Cause Four Funerals

By JAKE, THE LINEMAN

How are they going, buddies? Are your spirits up or down? Thar's an ole sayin' which goes something like this: "When we're up, we're up; when we're down, we're down; when we're only half-way up, we're neither up nor down."

You know that's a good little thought ter remember at this time of the year when most of our employers are starting accident campaigns, and intend to go through the year with nary an accident.

Shucks, all of us should get the feelin' that "when we're up" an' goin' along without any accidents, things are goin' good. And we should also realize that when we have had a few accidents "we're only half way up," and we haven't a thing to be proud of. We should also remember that if we are havin' "oodles and gobs" of accidents, it's time to get the "old Irish up" and start doin' something about it.

It would be somethin' to be proud of, if we could all stay up durin' the coming months, an' give "Old Man Accident" nothin' but a flock of goose eggs for his efforts to trip us up. Watch your step and the first thing you know you'll be helping your company to hang up a safety record that will be worth writing home about.

After all, making a no-accident record is sorta like makin' the old alarm clock run. The clock ticks off the seconds jist as long as it is kept wound up. Then someone forgets to wind it and, wearily, the clock keeps a'tickin' until it runs down—and it stays run down until someone winds it up again.

A "No-Accident Record" acts the same way. It goes along adding "no accident" days jist as long as every worker keeps workin' safely. Suddenly one worker forgets, just as we often forget to wind the alarm clock until after it has run down. An accident happens and the "No-Accident Record" is stopped. It has to be wound up and started all over again, and the employes have the responsibility of keepin' it goin'.

Your job and mine is to see that no accidents happen. By tending to that one job as we should, our "no-accident" records will always be "up." There will never be no "half-way ups" or "clear downs," and that is our goal during the year of 1935.

An' now, I have on my desk the reports on four tragic accidents, which cost the lives of four men and robbed four men's families of their providers. Four accidents which could have been prevented:

Accident No. 1 tells us of a splicer who had just started to use paraffin, which had been lowered in to the manhole, when it suddenly burst into flames. He called to his helper to pull the pot out of the hole. In doing so, the helper allowed the pot to strike against the manhole frame. The blazing paraffin spilled out onto the splicer and caused burns from which he died eight hours later. Upon questioning the helper, it was discovered that although the helper had a thermometer he had not used it to determine the temperature of the paraffin.

His failure to follow the routine cost a man's life. Probably he will remember the accident fer the remainder of his life, but that won't bring the dead splicer back.

Accident No. 2 tells us of a lineman who, during the replacement of defective cable, climbed a pole to help in passing the running line through some trees. He ascended the pole to the height of the strand, and placed his safety strap around the pole. As he leaned back to reach for the rope, the safety strap let go and he fell to the ground fracturing his skull and receiving other injuries which later caused his death. As his safety and body belt were in good condition, it is believed that the unfortunate victim hooked his safety into the keeper, in which he carried his pliers, instead of into the Dee ring.

Accident No. 3 brings us the report of a lineman who was removing old cable strand. The strand coiled up under him in such a manner that it came in contact with a poorly-insulated trolley feeder. The lineman was electrocuted instantly.

Some will say that the power company was at fault in this accident—but the lineman should have looked the job over before he ever started removing the strand. Undoubtedly he would have noticed the defective condition of the feeder and, if he had reported it to his foreman, the condition would have been corrected before he ever started to work.

Our fourth accident report describes the case of a cableman who was standing on a 12-foot ladder placing cable rings on suspension strand inside of a building. The ladder slipped and the employe fell to the floor receiving a fractured skull which later caused his death.

Investigators discovered, from marks on the floor, that the employe had placed the ladder four feet and ten inches from the wall and that this angle was responsible for the ladder slipping.

Wa'll, buddies, thar's four tragic accidents and there's a lesson in every one of them. Carelessness! What a vile word. Rid your system of it before it gets the best of you.

Guess I'll amble along now, but until I return, remember: "Don't rob your family of happiness by having an accident."

Activities of Commissions and Courts

Proposed FCC Order on Free Telegraph Service

A proposed order limiting the amount of free telegraphic service granted to any one person by any telegraph company to $10 in a calendar year was made public on January 2 by the Federal Communications Commission.

The order, which is in the form of an amendment to franking regulations on which a hearing will be held January 14, follows revelation that large sums have been "lost" to the telegraph companies in operating revenues by the extension of free facilities to customers, particularly to railroads.

The proposed amendment reads:

"No frank or franks shall be issued by any carrier purporting to authorize any person to send messages the regular charges on which in the aggregate would exceed $10 in any calendar year; nor shall any person use or attempt to use in any calendar year any frank or franks issued by one carrier for the sending of messages the aggregate charges on which, at regular rates, would exceed $10 in any calendar year."

• • •

Former Representative to FCC Vacancy

The resignation of Hampson Gary as a member of the Federal Communications Commission was announced at the White House on January 3. It became known from other sources that Anning S. Prall, former Representative from New York, has been appointed to fill the vacancy.

Mr. Gary's letter of resignation showed that he accepted the post with the understanding that he would resign by January 1. He has been mentioned as probable appointee to a diplomatic post.

An appointment to the Federal Radio Commission was offered to Mr. Prall last year but he did not accept before that commission was supplanted by the Federal Communications Commission.

Under the law Mr. Prall could not have accepted a place on the FCC before the opening of the new Congress on January 3, as he was a member of the Congress which created the commission.

Born on Staten Island September 17, 1870, Mr. Prall attended the public schools of New York. He was vice-president of Cosgrove & Co. of New York City and served as president of the New York Board of Education and also as a commissioner of taxes and assessments. He was a member of the 68th and 73rd Congresses.

• • •

Communications Companies Defend Rate Charges

Briefs denying discriminatory charges for telegraph service and defending rate classifications were filed on January 2 with the Federal Communications Commission by the American Telephone & Telegraph Co. and 25 subsidiaries; the Postal Telegraph-Cable Co., the Mackay Radio & Telegraph Co., the Commercial Cable Co., the Commercial Pacific Cable Co., and All America Cables. The Western Union Telegraph Co. did not file.

The brief of the A. T. & T. Co. set forth that income from its teletypewriter service has grown from $4,401 in 1931 to $7,103 in 1932 and to $270,310 in 1933. Of the latter figure, $169,259 was received by the New York Telephone Co.

The leased wire and teletype service of the A. T. & T. Co. has long been the object of attack by the telegraph companies, which allege unfair competition with their service.

• • •

Kentucky Independents Protest Rate Revisions

On December 19 the Kentucky Public Service Commission took under advisement the request of four Independent telephone companies that they be exempted from the recent order of the commission abolishing the differential for desk sets, or be given a year to readjust their affairs and at the end of that time be granted another hearing.

The tentative order of the commission, issued several weeks ago, abolsion, issued several weeks previous, abolsets and placed a maximum charge of 25 cents per month on handset telephones for three years.

The following appeared before the

Install It . . .
Inside or Outside

MOUNTED INSIDE—Cook "O" type is a miniature pole cable terminal and when mounted in a basement is fully enclosed, fireproof, free from dust, dirt, whitewash, condensation or bugs.

The grounded zinc hood eliminates any danger to the subscribers.

MOUNTED OUTSIDE — On the side of a building it prevents high potentials from entering the subscribers' premises. It is easily accessible to your maintenance crew, whether the subscriber is home or not.

The "O" type is designed for outdoor service. From the husky piece of porcelain, slotted to prevent cross talk, to the phosphor bronze springs and Everdur studs, there is not a part that can be effected by the most severe climatic conditions.

FOR FULL INFORMATION ON COOK "O" TYPE

ASK YOUR JOBBERS SALESMAN

OR WRITE

COOK ELECTRIC CO.
2700 Southport Ave. Chicago, Ill.

commission: C. H. Wore, of the Kentucky Independent Telephone Association of Glasgow, and manager of the Southern Continental Telephone Co.; J. R. Matthews, of the Southeastern Telephone Co. of London, Ky., and the Northeastern Telephone Co. of Augusta. Ky.; F. C. Meyland, of the Ashland Home Telephone Co., and R. B. Caldwell, trustee of the Kentucky State Telephone Co. of Brooksville.

• • •

Exceptions to Rate Cut Overruled in Carolina

On December 21 the North Carolina Utilities Commission overruled the exceptions filed by the Southern Bell Telephone & Telegraph Co., in protest against the reductions in telephone rates ordered into effect January 1 at 58 exchanges of the company in North Carolina.

The commission recently ordered reductions amounting to a decrease of approximately $321,000 in the annual income of the company, or an average of about 12 per cent. The order set forth that the commission had set a fair value of $13,000,000 on the intrastate property of the company, which would allow a return of more than 6.86 per cent with the reduced rates.

In its answer, the Southern Bell company alleged that its property is worth $18,500,000 and that the proposed rates would be confiscatory and leave the company able to earn less than 4 per cent on its investment.

The company's exceptions set forth that the commission had considered data which were not in the evidence presented at the hearings and contended that the order was not based on the facts or the evidence.

• • •

Commission Orders Bell of Tennessee to Reduce Rates

On December 27 the Tennessee Railroad & Public Utilities Commission issued an order reducing the rates of the Southern Bell Telephone & Telegraph Co. 10 per cent, an estimated annual reduction of $500,000. The lower rates were scheduled to become effective the first of the year.

In the four larger cities—Knoxville, Chattanooga, Memphis and Nashville—charges for business telephones were ordered reduced 50 cents a month. One-party residence charges were reduced a similar amount, while rates on two-party or other party lines were ordered reduced 25 cents a month. The commission ordered that the additional monthly charge on handset telephones be cut from 25 cents to 15 cents a month.

In addition to subscribers in the four cities named, those in more than 125 municipalities in the state will be affected by the reduction order.

The rate reductions sought in the original petition, filed by a number of Tennessee cities, varied in proportion to the size of the municipalities seeking the rate cuts. The reductions sought, it was brought out at the hearing, amounted to approximately 20 per cent.

• • •

Commission Rulings and Schedule of Hearings

ILLINOIS.

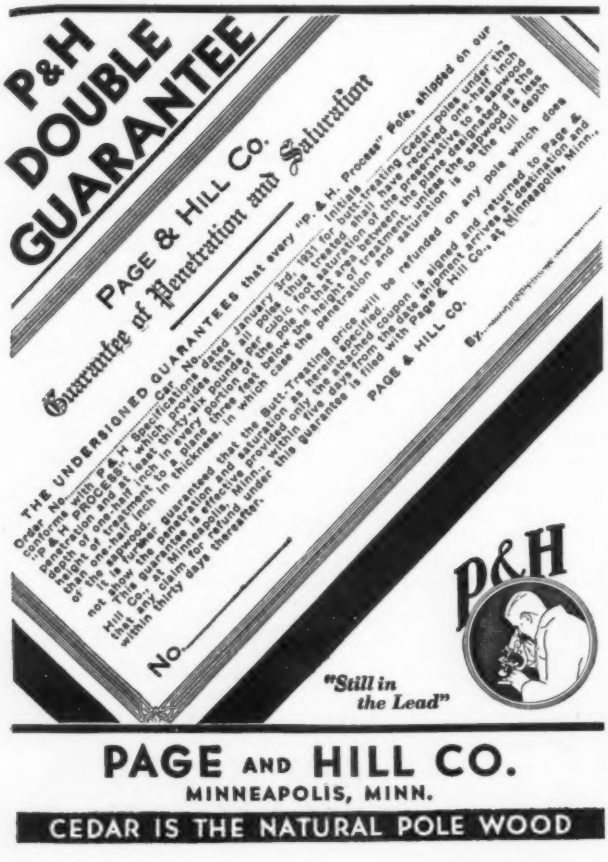
January 8: Hearing in Springfield on application of the Illinois Commercial Telephone Co. for authority to discontinue the telephone exchange at Downs, McLean county, and to serve the present subscribers on rural lines out of the LeRoy exchange.

Petition presented of subscribers of the Downs telephone exchange that the case be reopened for further hearing.

January 8: Hearing in Springfield on the complaint of H. C. Baker et al., against the Illinois Commercial Telephone Co., relative to the telephone exchange at Downs, McLean county.

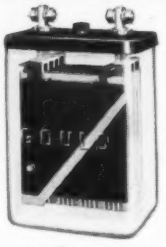
KENTUCKY.

December 19: Commission took under advisement the request of four Independent telephone companies—the Southern Continental Telephone Co., the Southeastern Telephone Co., the Askland Home Telephone Co., and the Ken-


P&H
DOUBLE
GUARANTEE
PAGE & HILL CO.
Guarantee of Penetration and Saturation
THE UNDERSIGNED GUARANTEES that every "P. & H. Process" Pole, shipped on our
Order No. ..... Car No. ..... dated January 3rd, 1931 for Initials .....
conforms with P & H Specifications dated January 3rd, 1931 for Butt-Treating Cedar poles under the
"P & H PROCESS" which provides that all poles thus treated shall have received a penetration and
depth of one-half inch in every portion of the sapwood and a saturation of the preservative to a depth
of one-half inch in thickness, in which case the penetration and saturation is to the full depth
of the sapwood.
It is further guaranteed that the Butt-Treating price will be refunded on any pole which does
not show the penetration and saturation as herein specified.
This guarantee is effective only when the attached coupon is signed and returned to Page &
Hill Co., at Minneapolis, Minn., within five days from the date shipment arrives at destination and
that any claim for refund under this guarantee is filed with Page & Hill Co., at Minneapolis, Minn.,
within thirty days thereafter.
PAGE & HILL CO.
By.....
No.....
P&H
"Still in the Lead"

PAGE AND HILL CO.
MINNEAPOLIS, MINN.
CEDAR IS THE NATURAL POLE WOOD

GOULD PLANTÉ PASTE BATTERIES



PLANTÉ PASTE CELL
The modern construction of the Planté Battery—ultimate in life, performance, and reliability—at lowest yearly cost.

... Offer maximum quality in all respects!

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GOULD STORAGE BATTERY CORPORATION OF DEPEW, NEW YORK
BUILDERS OF AMERICA'S MODERN BATTERY
Sales Offices in the Principal Cities of the U. S. A.

tucky State Telephone Co.—that they be exempted from the commission's recent order abolishing the differential for desk sets and limiting the extra handset charge of 25 cents a month for three years; or that they be given a year to readjust their affairs and at the end of that time be granted another hearing.

MINNESOTA.

January 3: Order issued approving the sale of the Zumbro Falls Farmers Telephone Co., of Zumbro Falls, to the Zumbro Falls Farmers Telephone Exchange Co. M-2303.

MISSOURI.

December 15: Order issued denying application of the city of Caruthersville for an order requiring the Southeast Missouri Telephone Co. to reduce its rates for that city.

NEBRASKA.

December 29: In the matter of the application of the Craig Telephone Co. for authority to continue in effect until February 1, 1936, the present emergency schedule of rates; found reasonable and ordered made effective until the date named, unless sooner canceled.

December 29: On motion of the Lincoln Telephone & Telegraph Co. application for closing of exchange at Saronville was canceled and withdrawn, without prejudice to renewal.

December 31: In the matter of the application of the Scotia Independent Telephone Co. for authority to make a special discount rate of 25 cents a month to town resident subscribers who pay a month in advance, to rural patrons who pay six months in advance; found reasonable and granted as asked.

December 31: Application filed by the Central Nebraska Telephone Co. for authority to reduce telephone rates for rural residence service at Brady and Maxwell to $1.50 a month.

January 1: Application filed by Petersburg Telephone Co. for authority to issue $6,000 of stock in connection with reorganization.

January 1: Informal complaint filed by Garfield Mutual Telephone Co. against Nebraska Continental Telephone Co. regarding toll service furnished by defendant company.

January 2: Informal complaint filed by Emil Bilz against Northwestern Bell Telephone Co. with respect to its single line rural business service rate.

January 2: Application filed by Leroy L. Bebout, of Johnstown, for an order requiring the Burlington railroad to place a telephone in its station.

NORTH CAROLINA.

December 21: Commission overruled exceptions filed by the Southern Bell Telephone & Telegraph Co., protesting against the inauguration of lower rates at its 58 exchanges in the state. The commission recently ordered reductions, effective January 1, aggregating about $321,000 annually or an average of about 12 per cent, and set forth a fair value of $13,000,000 on the intrastate property of the company on which it would earn more than 6.5 per cent, it was stated in the order.

NORTH DAKOTA.

November 27: Approval granted the joint application of the Northwestern Bell Telephone Co. and Progressive Farmers Telephone Co., Velva, for authority to buy and sell, respectively, telephone property in Velva.

(*Please turn to page* 34)

The Manufacturers' Department

Vandergrift, Pa., Installs Additional Equipment

An order has recently been received by the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., for rehabilitating equipment for the Vandergrift Telephone Co. of Vandergrift, Pa.

The local positions of the main switchboard are to be entirely revamped. When completed, it will be one of the finest operating boards in the territory, equipped throughout with the latest type Stromberg-Carlson super-service features.

* * *

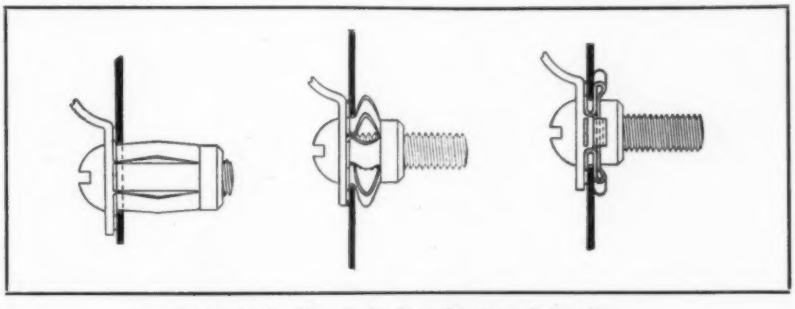
To Install Strowger All-Relay Dial Equipment

Bowling Green, Fla., will soon enjoy automatic (dial) telephone service furnished by an all-relay C-A-X (community automatic exchange). Orders for this equipment have been placed with American Automatic Electric Sales Co. of Chicago, Ill., by the Inter-County Telephone & Telegraph Co. of Fort Meyers, Fla., of which J. W. Gillentine is president and general manager.

The Inter-County Telephone & Telegraph Co. owns and operates not only the Bowling Green exchange, but some 15 other exchanges in Florida as well, and is known for its alert and progressive policies. In ordering the Strowger all-relay equipment for Bowling Green, provision is being made for an initial installation of 30 lines of apparatus—but ample facilities in the way of framework, etc., are furnished to permit easy expansion to 50-line capacity as the need requires.

Diamond Crimp-Nut; Secure Attachment

The Diamond Expansion Bolt Co., of Garwood, N. J., has issued bulletin No. 323 describing and illustrating the new Diamond crimp-nut. This new device will no doubt be welcomed by telephone men since it provides a secure means of attachment on a partial or wholly completed sheet metal structure, even though the back or interior may not be accessible.



Stages in the Use of the New Diamond Crimp Nut.

The manufacturers assert that the crimp-nut may be quickly placed in position and that usually one-half inch of space is sufficient. Its holding capacity is said to equal that of a standard bolt.

To use the crimp-nut when access is available to the face of the structure only, a hole is drilled or punched at the desired location of a diameter sufficient to clear the threaded portion. The nut is then inserted. The slight bulge compresses so as to permit it to enter the hole freely, afterward assuming its original form. This prevents its accidental withdrawal.

The work is then placed in position, a bolt or screw turned in and tightened up. When the fastening is complete, the nut is crimped tightly to the metal and will not turn when the screw is entered or removed, the bulletin asserts. This is essential where provision must be made for removing and replacing work, as is the case in telephone construction.

* * *

Oregon Exchange Has Dial Equipment

The first full automatic telephone system to be operated by an Independent telephone company within the state of Oregon was cut into service early last month at Glendale, a thriving little city in the southwestern lumbering district of the state, served by the Glendale Telephone Co. As far as is known the only other full dial systems, within the state are those operated by affiliates of

Freedom from interference between telephone and telegraph channels is obtained in this method by the use of the inductance coil, *A*, and condenser, *B*, as shown in Fig. 3. It will be observed that the inductance coil is in series with the telegraph leg and the condensers are in multiple.

When the telegraph key is pressed, the current would tend to build up rapidly to some maximum value. This sudden surge of direct current over one side of the telephone circuit would result in interference to the telephone channel.

The use of the inductance and condensers prevents this, for at the moment the key is closed the condensers begin charging and at the same time the current is prevented from surging into the line by the retarding effect of the inductance. The current is thus slowed up so that it builds up to its maximum value as shown in Fig. 4-B rather than like Fig. 4-A (without the condenser and inductance).

When the telegraph key is opened, the tendency of the direct current would be to drop off abruptly as shown in Fig. 4-A; but in the composite circuit the current is made to drop off less abruptly, due to the combination of condenser and retard coil resisting any change. Thus the current tapers off as shown in Fig. 4-B.

Range of Frequencies of Telegraph Circuits

It is apparent that the frequency of the signals impressed on the line by a composite telegraph leg must not extend into the range of frequencies to which telephone apparatus is sensitive; otherwise there will be interference between telephone and telegraph circuits.

The approximate top frequencies obtained with various types of telegraph systems is as follows:

Type of System	Frequency at 40 Words per Minute
Simple hand Morse system.....	10 cycles
Printing telegraph	15 cycles

It can be readily seen that these frequencies are too low to be heard in the telephone channel of a composite line.

In addition to the inductance, *A*, and condenser, *B*, required in each leg of a composited line, it is also necessary to have two condensers in series with the drop side of the line to keep direct current from getting back in the telephone instrument and to also have an inductance with two condensers in series (Fig. 3) bridged across the line to

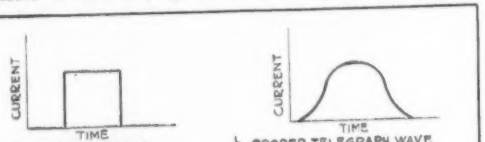


FIG 4. TELEGRAPH WAVE FORM

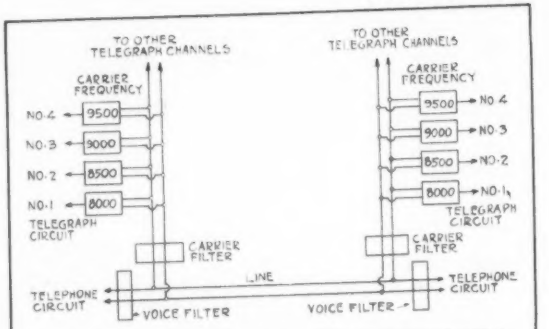


FIG 5. SCHEMATIC OF CARRIER TELEGRAPH ARRANGEMENT.

prevent "cross fire" between the two telegraph legs. It also prevents false operation of the telephone signals.

Other Methods of Superposing Telegraph on Telephone Circuits

In addition to simplexing and compositing telephone lines in order to obtain telegraph circuits, some of the larger companies also make use of carrier telegraph channels. In carrier telegraph systems a number of telegraph channels can be obtained from a single pair of wires by using frequencies separated from one another several hundred cycles and by means of filters at both transmitting and receiving end of the line. These voice and carrier telegraph channels are separated by the filters without any interference.

The carrier telegraph system finds its greatest use where a large number of telegraph circuits are required. Fig. 5 shows the general features of a carrier telegraph system.

Types of Telegraph Systems

The preceding sheets of this series discussed the several methods in use for obtaining telegraph circuits from telephone lines. Let us next consider the types of telegraph systems which are used on simplexed or composited lines.

The simplest type of telegraph system consists of key, sounder, relay, line, and batteries, arranged as shown in Fig. 6. The operation of this system requires that both stations keep the line keys closed when they are not sending. Thus current from the battery is flowing at all times.

When either operator wishes to send, it is only necessary to open the key and start sending. The relay is inserted directly in the line in place of a sounder, as the latter requires considerable current in order to produce good signals and would not operate efficiently in the relatively high resistance line.

The advantage of the simple telegraph system is its simplicity; and its disadvantage the fact that it permits only

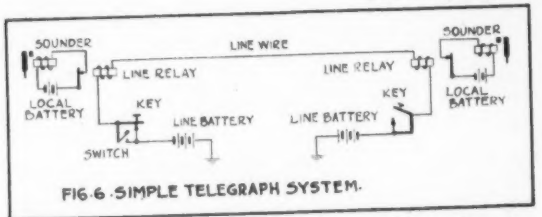


FIG 6. SIMPLE TELEGRAPH SYSTEM.

one-way operation and because of its electrical characteristics is not as suitable for high-speed operation as some of the other systems.

The line current required for satisfactory operation of a simple telegraph system varies from 0.04 to 0.09 ampere, depending upon the relays used. The high-wound, 150-ohm relays require less current than the lower-wound relays, such as the 35 or 20-ohm type.

The line relay is provided with a retractile spring and adjustable features so that the strength of the line current can be compensated for by adjustments of spring tension on the armature pole-piece spacing. The line current varies with line conditions, requiring a small gap and considerable tension in dry weather and a larger gap and less tension in damp weather.

Telegraph Repeaters

Telegraph currents in passing over line wires are attenuated in much the same manner as are telephone currents. It is, therefore, necessary to amplify or boost the telegraph signals at one or more intermediate points on long telegraph circuits. This is accomplished by having the attenuated incoming signals operate a sensitive relay which, in turn, connects a local supply of battery to the outgoing line; thus, in effect, giving the outgoing signals a new lease on life. The equipment required to amplify or boost telegraph signals is referred to as a *telegraph repeater*.

At first thought it would seem that a telegraph repeater would be a very simple device, arranged somewhat as shown in Fig. 7. Actually, a much more complicated arrangement is required than that shown in Fig. 7, due to the necessity of repeating signals in both directions; that is, in and out.

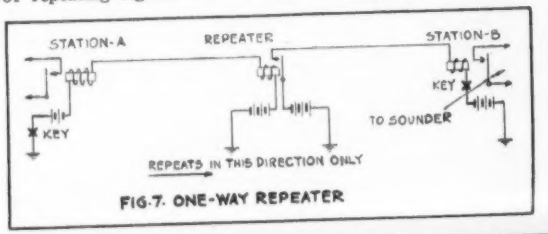


FIG 7. ONE-WAY REPEATER

the Bell System at Portland and Salem.

An all-relay automatic switchboard, manufactured by the North Electric Mfg. Co. of Galion, Ohio, has been installed in Glendale, replacing an old 115-line, 15-cord circuit, magneto switchboard made by the Western Electric Co.

A small manual switchboard fitted with four-cord circuits and a supervising cord has been installed to provide connections between several of the non-automatic farmer lines served through the Glendale exchange, and also for connections to the long distance lines of the Bell company. Direct wires connect the Glendale exchange with the Bell exchanges at Roseburg and at Grants Pass.

The new switching equipment is contained in a metal cabinet about three feet wide and about eight feet high. The new equipment will handle 30 lines at present but the board has an ultimate capacity of 60 lines. A 20-code ringing interrupter and a 20-cycle converter are a part of the new equipment.

A power test panel, 15 inches wide and six feet high has been installed alongside the main switchboard. This panel is equipped with a voltmeter and an ammeter. It is also fitted with numerous key switches for combining various circuits in making switchboard and line tests. A register meter or counter records the total number of calls and another register meter records the number of switchboard overloads.

A small power transformer and the ringing vibrator mechanism are installed on this panel as is also the electric clock which controls the automatic ringing and line disconnects.

A Westinghouse Electric & Mfg. Co.'s rectifier charging unit of three-ampere capacity, supplied by 60-cycle alternating current at 110 volts, is installed to charge eight new Exide storage batteries. Charging can be done at either a high or a low rate.

The batteries are contained in sealed glass jars with inbuilt charge indicators and have 24 cells with 50-ampere-hour capacity. Besides supplying the electrical energy for the automatic ringing, the new battery system will eventually supply all current used by the telephones and transmission lines. In event of a power failure these storage batteries can operate the switchboard for several days without being recharged.

All of the telephones now in use at Glendale have been fitted with North Electric automatic dials and have been rewired for automatic ringing.

The Glendale Telephone Co. was organized in 1906 and began operation January 4, 1907, with 28 telephones connected. A small manual switchboard located in the back room of a local drug store was the first central office. Whoever happened to be in that part of the store when a drop came down answered the call.

At the present time the Glendale Telephone Co. is serving approximately 130 subscribers in Glendale and the immediate vicinity over 30 lines. It also supplies local exchange facilities and long distance service to the two farmer-owned lines in Cow Creek valley east of Glendale and to a line serving the Wolf Creek district south of Glendale.

The Glendale Telephone Co. was purchased in August, 1908, by I. H. Smith, its present owner and manager. Mr. Smith also owns the telephone exchanges at Riddle and Canyonville.

Mr. Smith is very proud of the record made by the Glendale Telephone Co. during its 28 years of existence in that during this time no formal complaint regarding service given by his company has ever been filed with the state public service commission.

• • •

Western Electric Sales Increased in 1934

Sales of the Western Electric Co. will show an increase for 1934, first yearly gain in business shown since 1929. This was disclosed in a statement issued by the company late last month.

"Sales of Western Electric Co. for 1934 will be about $90,000,000 compared with $69,500,000 in 1933," the company reported, an increase of nearly 30 per cent. "Some further improvement is expected in 1935," it added.

The last time the company reported yearly sales better than the preceding year was in 1929 when total business done by the company amounted to $410,-950,000. Each succeeding year up to this year showed losses in sales.

The increased sales failed to lift the company out of the red in which it operated in both 1933 and 1932. The 1934 deficit, however, will be smaller than that shown in 1933, it is understood.

In 1933 on a sales volume of $69,-500,000 the company incurred a deficit of $13,773,000. In 1932 the company reported a deficit of $12,625,972 on a sales volume of $117,850,000.

As result of the better business enjoyed during the last year the company put 2,000 of its former employes back on the payroll. The rate of operation of the company's plants is 20 per cent of capacity as compared with 16 per cent at the close of 1933.

Despite the increase in sales for 1934, the total volume of business done still is substantially below that of 1932 or 1931.

The company has paid no dividends on the common stock since 1931. Virtually all of the company's stock is held by American Telephone & Telegraph Co.

Unaffected by SUDDEN TEMPERATURE CHANGES

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OWENS-ILLINOIS

HEMINGRAY

PIN TYPE GLASS

INSULATORS

• This improved, tougher Hemingray Glass — with its proven ability to withstand severe, sudden temperature changes—means better insulator service, lower costs. With the advantages of high dielectric strength . . . heavier side walls...thicker petticoats...always clear . . . smooth threads . . . tougher glass ...impervious to moisture...Hemingray pin-type Insulators offer greater economy in telephone insulator service. Write for samples and descriptive bulletin. . . . Owens-Illinois Glass Company . . . Hemingray Division, Muncie, Indiana.

Brief Telephone News From Various Places

Construction

NEW LISKEARD, ONT., CAN.—In order to take care of its gradually increasing business, the management of the Northern Telephone Co., Ltd., with headquarters here, has found it necessary to add considerable floor space to its existing premises in this city. Work is nearing completion on an additional structure of two stories and full-sized basement, of brick veneer exterior.

Substantial telephone business is now being carried on between this part of northern Ontario and the neighboring regions of Temiskaming and Cochrane. Extensions of similar service are also going forward into northern Quebec province which lies adjacent to this district.

SOUTH PORCUPINE, ONT., CAN.—To expedite telephone service in this locality a new central office switchboard, double the capacity of that in use here for some years past, has recently been installed. In addition, operations are proceeding currently toward the erection of a telephone line to connect Timmins and Schumacher, important mining and commercial centers also served in this territory by the Northern Telephone Co., Ltd.

Kirkland Lake, with its 1275 telephones in service at this time, has done away with the magneto form of operation and now has common battery service.

NEWCASTLE, IND.—The Indiana Bell Telephone Co. has just occupied its new $100,000 building in this city. The cut-over was made without interruption in service. The building houses a new and modern switchboard with a capacity for a city of 40,000 persons.

LISCOMB, IOWA.—The directors of the Liscomb Mutual Independent Telephone Co. have placed an order for a new switchboard to replace the present equipment.

The Liscomb company has weathered the depression, it is stated, without going into debt and has lowered its rates to subscribers. In common with the larger telephone companies it is experiencing a gradual increase of patrons. There was some loss of subscribers due to the financial conditions, but in most cases there have been reinstallations in the past few months.

CLEVELAND, OHIO.—The Ohio Bell Telephone Co. has announced an appropriation of $2,000,000 for 1935, which will be used for repairs and improvements.

TOLEDO, OHIO.—Work will be started in the early spring by the Ohio Bell Telephone Co. on the construction of its new Walbridge exchange building in Toledo, which it is estimated will cost about $60,000. The announcement has just been made here that Mills, Rhines, Bellman & Nordhoff, local architects, have been engaged to prepare the plans, and these will be completed in time for bids to be received March 15.

The new exchange building, while a one-story structure with basement, will be so constructed that it can be converted into a two-story structure if and when such additional space may be needed. The building will be 79 by 65 feet, and will be of brick, stone and reinforced concrete.

Elections

WOODSTOCK, ONT., CAN.—James A. Vance, of this city, and Harvey A. Wood, of East Oxford, were elected at a recent meeting here as directors of the Princeton & Drumbo Telephone Co., Ltd. These appointments fill two vacancies recently caused through the deaths of former directors Wynn Wood and W. H. Kipp.

At a special directors' meeting, the following officers were named: President, Jas. A. Vance; vice-president, Harvey A. Wood; secretary-treasurer, Ernest Harley; director, John Sippel.

LYMAN

MAYNARD, IOWA.—The Fayette County Mutual Telephone Co. elected F. H. Schmitt president at a recent meeting here. Other officers named, all Fayette men, were John Morph, vice-president; J. S. Briggs, secretary, and F. B. Claxton, treasurer.

Directors were W. C. Wells, Randalia; E. J. Langerman and Theo Miehe, Fayette, and J. Ponsor and A. L. Evans, Maynard.

Miscellaneous

BICKNELL, IND.—Ralph McDermont, manager of the local exchange of the Southern Indiana Telephone & Telegraph Co., is more a believer in advertising now than ever. Recently one of the company trucks dropped some tools. An advertisement was put in the local paper, and the next day Mr. McDermont had twice as many tools returned as were lost.

LOCHIEL, IND.—The Lochiel exchange was discontinued on January 1 and patrons are being given service from the Remington and Goodland exchanges. The Lochiel exchange was established 40 years ago. N. N. Bott is owner of both the Remington and Lochiel companies.

HUMESTON, IOWA.—H. W. Marks, owner and manager of the Humeston Telephone Co., has been retained by an Independent telephone group to make appraisals, inventories and rate surveys, and to furnish reproduction costs of certain telephone plants from time to time as required for their information. These plants are located in central and southern Iowa.

WOODBURN, IOWA.—A. J. Ecklund, of Woodburn, has leased the local telephone property from the Utilities Holding Corp., with headquarters in Plattsburg, Mo., and will operate the exchange under the name of the Woodburn Telephone & Electrical Co.

Mr. Ecklund formerly owned the local telephone property for a period of 10 years, selling out to a Mr. Hunt, who later sold the plant to the present owners. He has been engaged in electrical work for the past six years.

BOSTON, MASS. — William Brewster, Jr., since June, 1933, with the commercial department of the New England Telephone & Telegraph Co. here, has been appointed traffic manager for the company at Fitchburg, Mass.

PITTSFIELD, MASS.—Robert P. Russell has been appointed traffic manager of the New England Telephone & Telegraph Co. group area embracing North Adams, Adams and Williamstown. He was educated at Tufts College and, after attending the Harvard Law School for one year, joined the company in 1932, spending most of his time since as commercial sales representative in the Berkshire district with headquarters at Pittsfield.

LINCOLN, NEB.—Harold Laipply, traveling auditor for the Lincoln Telephone & Telegraph Co., has been named revenue accountant, reporting directly to General Accountant I. J. Devoe. S. S. Bush has been promoted to be traveling auditor, with G. D. Jahn as his assistant. All of the appointees are trained accountants with excellent service records.

ALBEMARLE, N. C.—The new stockholders of the Albemarle Telephone Co. held their first meeting here recently and formally took charge of the property of the local concern.

Election of officers for the coming year was held, and W. C. Houseton was named president. Theo Schramm was elected vice-president; L. D. Coltrane, Sr., treasurer and secretary and assistant manager. All officers are citizens of Concord.

It was announced at the meeting that all present employes of the company would be retained and that Miss Mary G. McLaughlin would be in charge of the new business office.

MEDORA, N. D.—At a meeting of the business men's club during November, plans were pushed for a telephone exchange in Medora. The telephone company will be a mutual concern, with the switchboard in the E. K. Rusth home. Men at the CCC winter camp here were scheduled to build the line.

GREENVILLE, OHIO. — The Lightsville Telephone Exchange, Darke county, has been discontinued, due to changes in toll rate regulations. The 28 subscribers at Lightsville are now being served by the Union City exchange.

The Lightsville exchange operators, Miss Edith Cultice and Miss Ada Strait, will be provided with jobs at other exchanges, it was stated.

ELECTROX RECTIFIERS
For charging storage batteries in Telephone Service or operating P-B-X, P-A-X, C-A-X Systems without batteries.
Write for Circular 332.
Schauer Machine Co.
905 BROADWAY
CINCINNATI, OHIO

Buyer's Weekly Guide

A list of firms and companies offering equipment, supplies or services for operating telephone companies

ADDING MACHINES

Burroughs Adding Machine Company, Second Blvd., Detroit, Mich. — Adding, Bookkeeping, Calculating, Billing and Accounting Machines, Electric Carriage Typewriters, Standard Typewriters, Operator Correct-Posture Chairs. Burroughs machines are in use today in hundreds of progressive telephone companies throughout the country.

BATTERIES—DRY CELLS

Bond Electric Corporation, 257 Cornelison Ave., Jersey City, N. J.—Bond Telephone Dry Cells, Bond Flashlights and Batteries, Industrial Flashlights and Batteries, Bond Dry Batteries, Storage Batteries, Voltpruf Special Flashlights for linemen, Victor Telephone Cells and Bond Formula 1216 Inhibitor, ideal for keeping the cooling system of trucks and service cars free from rust, scale and corrosion.

National Carbon Company, 30 E. 42nd St., New York.—"Columbia" Telephone Dry Batteries; "Eveready" Flashlights, Flashlight Batteries and Long Life Dry Cells, "National Pyramid" brushes, carbon, graphite and metal graphite for motors, generators and rotary converters. "Eveready" Prestone anti-freeze; "Eveready" Rustone rust preventive; and "Eveready" Air Cell telephone operators' transmitter batteries.

Ray-O-Vac Company, Madison, Wis.—Ray-O-Vac telephone batteries — longer life and better service proven by tests in accordance with U. S. Government standards and records of users. Ray-O-Vac flashlights and industrial flashlight batteries are other items showing Ray-O-Vac's outstanding quality.

BATTERIES—STORAGE

The Electric Storage Battery Company, Allegheny Ave. and 19th St., Philadelphia, Pa.—Exide Storage Batteries. Branches: Boston, New York, Rochester, Philadelphia, Pittsburgh, Washington, Atlanta, Cincinnati, Cleveland, Detroit, Chicago, Kansas City, Minneapolis, St. Louis, Denver, San Francisco and Seattle.

BATTERY CHARGING EQUIPMENT

General Electric Company, Bridgeport, Conn.—Tungar battery chargers. G-E pole line hardware. Cable filling compound.

CABLE—LEAD ENCASED

British Insulated Cables, Ltd., Surrey House, Embankment, W. C. 2, Factory: Prescot, Lancashire, England.—Telephone cable of all sizes and capacities.

General Cable Corporation, 420 Lexington Ave., New York, N. Y.—Paper telephone cables of standardized manufacture for over forty years. Weatherproof and insulated copperweld drop wire.

Eugene F. Phillips Electrical Works, Ltd., Montreal, Can.—For any type of wire or cable used in telephone, telegraph or power work get in touch with "Phillips." Manufacturers of bare and insulated copper wires, rubber insulated wires, enameled wire, magnet wire, telephone cables, power cables, switchboard cables, flexible cords, copper rods, etc.

CABLE RINGS

National Telephone Supply Company, 5100 Superior Ave., Cleveland, Ohio.—National Cable Rings, National Splicing Sleeves, Non-Breakable Messenger Cable Hangers, Marlin and Swisher Cable Hangers and Custom Galvanizers. National cable rings are practical because they are two-way,—they allow the cable to be pulled in either direction. National sleeves make secure the weakest points in the line. If it's a splice—make it a National.

CABLE TERMINALS

Cook Electric Company, 2700 Southport Ave., Chicago, Ill.—Protective Pole Cable Terminals, Unprotected Pole Cable Terminals, central office protection, lightning arresters, sleeves, fuses.

Reliable Electric Company, 3145 Carroll Ave., Chicago, Ill.—A complete line of telephone and switchboard protectors and specialties. All sizes of cable grips.

CARBON DIAPHRAGMS

Noris Carbon Company, Inc., 160 5th Ave., New York, N. Y.—Carbon diaphragms, carbon back plates, granular and globular carbons, lightning arresters.

CONDUIT

Brazil Hollow Brick & Tile Company, Brazil, Ind.—Makers of Brazil Vitrified Tile. Conduit.

CORDS, CABLE AND WIRE

Lenz Electric Manufacturing Co., 1751 N. Western Ave., Chicago—Established 1904—telephone and switchboard cords for all makes of equipment, braided and lead-covered telephone cable, flame-proof jumper wire, interior telephone wire, switchboard wire.

CORDS AND WIRE

Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago—Telephone and Switchboard Cords, Flame-proof Jumper Wire, Switchboard Wire, Interior Telephone Wire. W. L. Runzel, President, has devoted over 40 years to the making of fine telephone cords.

ELAPSED TIME RECORDERS

Calculagraph Company, 50 Church St., New York, N. Y.—Calculagraph is the world's standard elapsed time recorder and gives you toll records printed with elapsed time to the second. Both spring driven and electric motor models are available.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

Alfred E. Cowling, Scotstown, Quebec.—Eastern cedar poles, plain or butt treated.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

Michigan Pole & Tie Company, Newberry and Grand Rapids, Mich. — "Poles with Character." Northern White and Western Red Cedar. Strategically located yards, Minneapolis, Minn., and Reed City (Lower Michigan), insure quick deliveries.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada — Western Red Cedar Poles. Plain or Butt treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or Butt treated.

SUPPLIES, SWITCHBOARDS AND INSTRUMENTS

Automatic Electric Company, 1033 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Telephones, relays, signalling and control equipment.

Automatic Electric Company, Ltd., Milton Road, Edge Lane, Liverpool, England.—Automatic Telephone Equipment.

Automatic Electric Sales Company, Ltd., 1027 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Manual Telephone Equipment, telephones, storage batteries, wire, cable, poles, etc.

Kellogg Switchboard & Supply Company, Adams & Aberdeen Sts., Chicago, Ill.—Engineers and designers, manufacturers and suppliers of complete equipment for telephone exchanges and communication systems. Manufacturers of "Master-built" Common Battery, Magneto and PBX Switchboards, "Masterphone" Telephone Instruments, and a complete line of telephone supplies, including bronze drop and interior wire.

North Electric Manufacturing Company, Galion, Ohio—Machine switching telephone systems. Automanual and Automatic. "All-Relay" Switching Apparatus (Dialless and Dial Control). Unattended Satellite Systems.

Siemens Brothers & Company, Ltd., Woolwich, England—Automatic and Manual Telephone Equipment.

Stromberg-Carlson Telephone Manufacturing Company, 100 Carlson Road, Rochester, N. Y. — Telephone apparatus of all kinds, switchboard cords, cable and general telephone supplies.

TOOLS

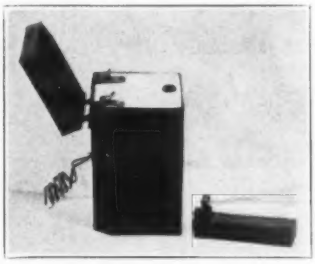
Crescent Tool Co., Jamestown, N. Y.—CRESTOLOY Pliers, Curved Needle Nose Pliers, Heavy Diagonal Cutting Pliers, Linemen's Side Cutting Pliers, End Cutting Nippers, Crescent Hack Saws.

TRANSMITTER REPAIRS

The Telephone Repair Shop, 1760 Lunt Ave., Chicago, Ill.—Transmitters completely rebuilt and arranged for either magneto or C. B. service. Transmitter fronts and backs refinished in black. Transmitter buttons cleaned and refilled. Receivers repaired; ringer coils and generator armatures rewound.

CLASSIFIED SECTION

Rates 10 cents per word payable in advance. Minimum charge $2.00 for 20 words or less.



Locate cable trouble with the **CANTY FAULT FINDER.** This new cable tester operates on two dry cells and locates all cable faults (except opens). There are two binding posts for lead wires to bad cable pairs. Adjustment of tone is simple,—move lock nut up or down. Size 3"x4"x7". No telephone exchange should be without the **CANTY FAULT FINDER.** Price $12.50 postpaid complete, less head set. Address 8101, care of TELEPHONY.

CORRESPONDENCE COURSES FOR TELEPHONE MEN

Course No. 112—ELECTRICAL ENGINEERING—Very complete and understandable. Comparable with college course. Complete, $10.50.
Course No. 113—RADIO—PUBLIC ADDRESS—PHOTO ELECTRICS—ELECTRONICS—An ultra-modern course in radio, public address, photo electric, and electronic work. Graduates are true "Vacuum Tube Technicians." Complete, $25.00.
Ideal training courses for telephone men.
Lowest cost—best value correspondence courses in America.
Payment Plan ($1.00 per month). Write for Catalog.

LINCOLN ENGINEERING SCHOOL
855-X S. 37th Street Lincoln, Neb.

T. F. A.
(Telefon Fabrik Automatic)

SWITCHBOARD PLUGS

Moulded insulation type

You can't buy better!

Carried in stock

To replace all makes and the price is right.

BUCKEYE TELEPHONE AND SUPPLY CO.
COLUMBUS, OHIO

TELEPHONE REPAIR SHOP
Guaranteed Transmitter Service

Any quantity, one or one thousand.

Baked, black, velvet finish, New granular carbon. Workmanship, adjustments and tests made with the latest and most improved apparatus. 50c each less backs.

Full information on request.

Rogers Park Station, Chicago.

MODERNIZING AND REPAIR SERVICE

Have your old telephones modernized by us into late type wall or desk telephones which give you many years of service at a substantial saving.

ALSO

Send us your repair work for transmitters, receivers, generators, coils, etc. *Prompt Service.*

W. N. ALBERTSON COMPANY, INC.
3530-34 W. Pierce St., Milwaukee, Wis.

FAULTY TELEPHONES LOSE PATRONS!

Let us put your defective and inefficient equipment in perfect order.

UNION ELECTRIC CO.
1165 E. 30TH ST.
INDIANAPOLIS, IND.

FOR SALE

Selling practically new, late-type, push-in, folding-door telephone booths as low as $16.00 F.O.B. Chicago, in lots of 6. Single booth prices on request.

W. M. MILLER & SONS
2553 W. Madison St. Chicago, Ill.

WANTED TO BUY

WANTED TO BUY—Used Western Elec. Co. 300 type 5 bar magneto desk set boxes. Address Box 8106, care of TELEPHONY.

POSITIONS WANTED

COMPETENT Engineer-Manager desires position with active company. Experienced in all branches. Will furnish A1 reference. Address 8391, care of TELEPHONY.

POSITION WANTED—By capable telephone man with eighteen years' experience, plant and commercial. Can furnish satisfactory references. What have you? Address 8398, % TELEPHONY.

POSITION WANTED—Experienced cable splicer, age 35. Can handle all other outside telephone work. 7 yrs. with Bell Telephone. References. Address 8390, % TELEPHONY.

ACTIVITIES OF COURTS AND COMMISSIONS

(*Concluded from page 29*)

November 27: Approval granted the Northwestern Bell Telephone Co. for authority to discontinue local exchange service at Dawson.

November 27: Approval granted the revised message toll tariff filed by the Northwestern Bell Telephone Co. for the state of North Dakota.

December 12: General exchange tariff filed by the Northwestern Bell Telephone Co. covering directory listings and joint-user service in North Dakota.

December 12: Tariff filed by the Northwestern Bell Telephone Co. covering teletypewriter exchange service in North Dakota.

December 15: Approval granted joint application of the Shepard Telephone Co., Walhalla, a corporation, and D. E. Shepard and J. I. Shepard, d/b/a Shepard Telephone Co., Walhalla, a co-partnership, for authority to buy and sell, respectively, telephone property in Pembina, Cavalier and Towner counties.

December 15: In regard to application of the Williams County Mutual Telephone Co., of Ray, for authority to build one mile of telephone line to connect with Temple Rural Telephone Co. line; findings issued denying application without prejudice.

OHIO.

December 20: Authority granted the Austinburg Telephone Co., Ashtabula county, to file a new schedule of charges for collection of rentals. The change provides that the payment of $4.50 per quarter for service, less 25 cents, be changed to $1.50 per month, less 10 cents. This change will save the subscriber 20 cents per year.

December 21: Authority to increase its rates in Ottawa county requested by the Ottawa Farmers' Mutual Telephone Co. The company submitted figures intended to show that present rates do not provide a fair income.

Under the proposed schedule the rate for one-party business telephones would be increased from $1.50 net to $3.50 net. Resident service for one-party line would be increased from $1.25 to $2.25.

January 4: Petition filed by Gustav Hirsch, consulting engineer of Columbus, on behalf of a number of Independent telephone companies of the state, setting up the contention that existing requirements—that displaced stations, interior drops and block wire installations shall be charged against operating revenue—brought about a paradoxical situation.

This was due, it was stated, to the fact that many companies have accumulated reserves to care for such situations.

WASHINGTON.

January: Resumed hearing on the valuation, rates and service of the Pacific Telephone & Telegraph Co. and its subsidiary, the Home Telephone Co. of Spokane. The hearing was continued to early January from December 20.

WISCONSIN.

January 5: Order issued extending a temporary reduction in rates of the Mauston Telephone Co. to July 1, 1935. The commission said that 339 subscribers will benefit to the extent of $750 by the continuance of the lower rates.